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U.S. and International Responses to the Global Spread of Avian Flu: Issues for Congress

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Summary

Influenza A/H5N1 is the strain of influenza currently spreading throughout the world. Although it is a bird flu, it has infected a relatively small number of people — killing more than half of those infected. Some scientists are concerned that H5N1 may cause the next influenza pandemic. Flu pandemics have occurred cyclically, between every 30 and 50 years. Since 1997, when the first human contracted H5N1 in Hong Kong, the virus has resurfaced and spread to more than thirty countries in Asia, Europe, the Middle East, and Africa — infecting more than 180 people and killing more than 100. In February 2006, the virus spread from Asia and central Europe to western Europe. That month, officials confirmed that birds in Austria, Germany, Greece, and Italy were infected with the virus. In March 2006, health experts confirmed new bird flu cases among more than 20 countries across Europe, Asia, and Africa. Most of the countries were experiencing their first H5N1 cases. The first human H5N1 fatalities outside of Asia occurred in 2006 when Turkey and Iraq announced their first human deaths related to H5N1 infection in January 2006 and February 2006, respectively. Azerbaijan became the third country outside of Asia with human fatalities in March 2006.

A global influenza pandemic could have a number of consequences. Global competition for existing vaccines and treatments could ensue. Some governments might restrict the export of vaccines or other health supplies to treat their own population. Some countries might face a shortage of vaccines, antiviral medication, or other medical equipment, because of limited global supply. Hospitality and airline industries, and international trade could be negatively impacted. If global travel and trade were to suddenly drop, there could be productivity losses and service disruptions. Essential workers might become ill or stay home out of fear of contracting the virus. Such workers could include law enforcement, medical personnel, mass transit drivers and engineers, and other crucial emergency personnel.

Congress provided $31.3 million for international avian flu activities through FY2005 emergency supplemental appropriations. FY2006 emergency supplemental appropriations reserved $280 million for global H5N1 initiatives. The Administration requests $215 million for global H5N1 containment activities in FY2007.

Bills introduced in the 109th Congress would increase U.S. resources allocated to the global fight against avian flu; develop a "Pandemic Fund" to augment ongoing U.S. and international avian flu and pandemic preparedness initiatives; increase funding for preventing the spread among animals of the H5N1 virus; and strengthen surveillance capacity within affected countries.

This report will provide an up-to-date account of global H5N1-related human infections and deaths, outline U.S. government and international responses to the global spread of H5N1, discuss situations in various countries affected by H5N1, and present some foreign policy issues for Congress. This report will be periodically updated.

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Background

Bird (or avian) flu outbreaks have occurred at various times around the world.[1] Influenza A/H5N1 is the strain of bird flu currently spreading across the world. Although it is a bird flu, the virus has infected some people and killed more than half of those infected. Until 1997, there were no known human H5N1 cases. That year, 18 people in Hong Kong contracted the virus; of whom 6 died. To contain the virus, 1.5 million birds were killed. Since 2003, scientists have closely monitored resurgent H5N1 outbreaks, which have infected poultry in a growing number of countries.

According to WHO, the hallmarks of a pandemic are: 1) a novel flu virus strain emerges; 2) the strain causes human disease; and 3) person-to-person transmission is sustained. The pandemic steps usually occur in six phases. Table 2 shows the phases of a flu pandemic, as described by WHO. The current global H5N1 outbreak is in pandemic alert phase three, which means a virus new to humans is causing infections, but not spreading easily from one person to another.

Humans have no immunity against H5N1 since it is a bird flu and has not commonly infected people. Some predict that if H5N1 were to become transmissible among humans, an "influenza pandemic" (worldwide disease outbreak) could begin. Skeptics argue that such predictions are exaggerated, because if the virus were able to transform into a strain that is efficiently transmissible among people it would have already done so. Still some health experts stress that governments should prepare for some sort of pandemic. During the Spanish flu pandemic of 1918, it is estimated that between 20 and 50 million people died, and between 200 million and 1 billion were infected around the world. If a flu pandemic were to occur on the same scale as the Spanish flu, some estimate that between 30 million and 384 million people could die around the world,[2] of which 1.9 million deaths could occur in the United States.[3]

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[1] For a list of past avian flu outbreaks see CRS Report RS21747, *Avian Influenza: Agricultural Issues*, by Jim Monke.

[2] Osterholm, Michael, "Pandemic Influenza: A Harbinger of Things to Come." Presentation at the Woodrow Wilson International Center for Scholars, Sept. 19, 2005. [http://www.wilsoncenter.org/index.cfm?fuseaction=news.item&news_id=145329]

[3] HHS Pandemic Influenza Plan. [http://www.hhs.gov/pandemicflu/plan/].

Global Prevalence

Since 1997, when the first human contracted H5N1 in Hong Kong, the virus has resurfaced and spread to birds in forty countries across the world.[4] In 2004, nine Asian countries reported H5N1 poultry outbreaks. By August 2005, birds in Mongolia had become infected with the virus. Two months later, domestic birds in Russia and Kazakhstan had reportedly contracted H5N1 through contact with wild waterfowl at shared water sources. By late October 2005, H5N1 had spread westward, affecting six other regions in Russia, and infecting bird populations in Romania, Croatia, and Turkey. In 2006, countries in western Europe, the Middle East, and Africa reported H5N1 infection among poultry stocks for the first time. Also, Turkey, Iraq, and Azerbaijan reported the first H5N1 human cases outside of Asia. Although Iraq has reported human H5N1 cases no birds have been diagnosed with the virus. The chart below shows the latest number of confirmed human H5N1 cases as reported by WHO as of March 21, 2006.[5] Figure 1 in the Appendix maps the human H5N1 cases.

Table 1. Human Cases of Avian Influenza A/H5N1

Country	Cases	Deaths
Azerbaijan	7	5
Cambodia	4	4
China	15	10
Indonesia	29	22
Iraq	2	2
Thailand	22	14
Turkey	12	4
Vietnam	93	42
TOTAL	**184**	**103**

Source: WHO, *Cumulative Number of Confirmed Human Cases of H5N1*, March 21, 2006.

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[4] To date, H5N1 has been identified among birds in Afghanistan, Albania, Austria, Azerbaijan, Bulgaria, Burma, Cambodia, Cameroon, China, Croatia, Egypt, France, Germany, Greece, Hungary, India, Indonesia, Iran, Israel, Italy, Japan, Kazakhstan, Korea, Laos, Malaysia, Mongolia, Niger, Nigeria, Poland, Romania, Russia, Serbia and Montenegro, Slovakia, Slovenia, Sweden, Switzerland, Thailand, Turkey, Ukraine, and Vietnam. Viral samples taken from birds in Bosnia and Herzegovina, Denmark, Georgia, Iraq, and Pakistan are being studied. The viral samples have been classified as H5, a bird flu, but not as the H5N1 strain currently spreading across the globe. World Organization for Animal Health (OIE), "Update on Avian Influenza in Animals." March 20, 2006. [http://www.oie.int/eng/en_index.htm]

[5] WHO, *Cumulative Number of Confirmed Human Cases of Avian Influenza A/H5N1*, March 21, 2006. [http://www.who.int/csr/disease/avian_influenza/country/en/].

Transmission

There is some debate over how H5N1 is spread. Some experts contend that migratory virus-carrying wild bird species, notably water fowl, are a key H5N1 vector, or medium of transmission. H5N1 has been detected in migratory birds in multiple countries, and in some instances, its spread has been temporally correlated with seasonal migrations of certain wild species. In some countries, wild birds comprise the sole known H5N1-positive animal population. Some wild species may also be passive carriers of H5N1, harboring but not exhibiting disease symptoms or ill effects from the virus.[6] Other experts, however, maintain that cross-border trade in infected poultry and poor agricultural practices, including the use of infected bird feces in fertilizer and animal feed, may comprise equally or more important vectors. Indications that may support such assertions include the initial detection of H5N1 on commercial farms in caged poultry that are unable to mingle with wild fowl, and the detection of H5N1 on farms located far from wetlands where migratory birds seasonally dwell, or in regions where H5N1-linked wild fowl die-offs have not been reported. In some countries, such as in Nigeria, there are some indications that wild fowl may not be implicated in the transmission of H5N1.[7]

Congressional Response

Congress provided $31.3 million to support ongoing U.S. efforts to prevent and contain the global spread of H5N1 through P.L. 109-13, FY2005 Emergency Supplemental Appropriations. The act, which passed in May 2005, also provided funds for domestic pandemic preparedness.[8] Congress directed $25 million to the U.S. Agency for International Development (USAID). Pursuant to the statute, USAID transferred $15 million of the $25 million appropriation to CDC. The act also permitted the Secretary of State to transfer part of the tsunami relief funds to federal agencies for avian flu activities. Ultimately, an additional $6.3 million was transferred to USAID for international avian influenza activities,[9] bringing the total for FY2005 emergency supplemental spending on international avian influenza activities to $31.3 million.

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[6] See FAO, Wild birds and Avian Influenza, Sept. 2005, among other sources.

[7] See Ellen Paul [Exec. Dir., Ornithological Council], "What We Don't Know About Bird Flu," *Washington Post*, Dec. 27, 2005; BirdLife Int., "Are High Risk Farming Practices Spreading Avian Flu?," Jan. 18, 2006; and BirdLife Int., "Autumn Waterbird Migration Ends Without Spread of H5N1 Bird Flu," Aug. 12, 2005; David Brown, "Poultry, Not Wild Birds, Most Often Carries Deadly Avian Flu to Africa," *Washington Post*, Feb. 16, 2006; and AFP, "Bird flu outbreak in Nigeria stirs fresh row over migrant birds," Feb. 8, 2006.

[8] For more information on the domestic response to H5N1, see CRS Report RL33145, *Pandemic Influenza: Domestic Preparedness Efforts*, by Sarah A. Lister, and CRS Report RS21747, *Avian Influenza: Agricultural Issues*, by Jim Monke.

[9] FY2007 State Department Function 150 Budget Request. Of the $6.3 million, $1.8 million went to Asia and the Near East region, $3.0 million to Europe and Eurasia, and $1.5 million to sub-Saharan Africa.

In FY2006, the President submitted a $7.1 billion emergency supplemental request for avian flu and pandemic influenza preparedness. Appropriators attached $3.8 billion in emergency supplemental funds for avian flu initiatives, which reserves a portion for international efforts, to FY2006 Defense Appropriations.[10] The Office of Management and Budget (OMB) reports that $280 million was spent on global avian flu initiatives through FY2006 emergency supplemental appropriations.

The President requests an additional $215 million for international avian flu activities in FY2007. The Senate Budget Committee passed S.Con.Res. 83 on March 16, 2006, which provided $2.3 billion for pandemic influenza preparedness. Table 3 in the appendix outlines the Administration's FY2007 request for international avian flu initiatives, and enacted spending for those activities through FY2005 and FY2006 emergency supplementals.

Some Members have argued that the Administration had proposed allocating insufficient resources to the global fight against H5N1 and pandemic planning, particularly in Africa. For example, during the House Foreign Operations Subcommittee hearing on pandemic flu in March 2006, Chairman Jim Kolbe suggested that the $55 million that USAID was requesting for global avian flu initiatives might not be sufficient, and encouraged the agency to request additional funds if necessary. The Chairman also questioned why such a small proportion of the FY2007 requested funds were allocated to Africa (less than $10 million). A number of Members have introduced legislation to increase U.S. resources allocated to the global fight against avian flu. Some bills, such as H.R. 4062, *Pandemic Preparedness and Response Act* and its Senate companion, S. 1821, propose developing a "Pandemic Fund"to augment ongoing U.S. and international avian flu and pandemic preparedness initiatives. Other bills, such as H.R. 4476, *Global Network for Avian Influenza Surveillance Act*, and its Senate companion, S. 1912, advocate greater support for initiatives that prevent the spread of H5N1 among animals. A number of bills, such as H.R. 3369, *Attacking Viral Influenza Across Nations Act*, and its Senate companion, S. 969, suggest the U.S. strengthen surveillance capacity within affected countries. Bills, such as H.R. 813, *Flu Protection Act*, and its Senate companion, S. 375, aim to boost influenza vaccine supply. Additionally, other legislation, such as H.R. 4245, *Influenza Preparedness and Prevention Act* encourage greater international cooperation.

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[10] The FY2006 Defense, Disaster Assistance, and Avian Flu Preparedness Appropriations conference report, H.Rept. 109-359, contains $3.8 billion for avian influenza initiatives. $3.3 billion of the $3.8 billion is directed to the Department of Health and Human Services (HHS) (of which $267 million is reserved for international initiatives, disease surveillance, vaccine registries, research, and clinical trials). An additional $500 million is reserved for international assistance, monitoring and tracking, and research and development, of which $131.5 million is directed to USAID, $130 million to the Department of Defense, $71.5 million to the Department of Agriculture, $47.3 million to the Department of Homeland Security, $20 million to FDA, $27 million to the Department of Veterans Affairs, $31 million to the Department of State, and $11.6 million to the Department of the Interior.

U.S. Executive Branch Response

On November 1, 2005, the President released the National Strategy for Pandemic Influenza.[11] One day later, on November 2, 2005, the Administration released the U.S. Department of Health and Human Services (HHS) Influenza Plan. The HHS plan provided a detailed explanation of how the national strategy would be implemented. Some were disappointed by the relatively small proportion of funds reserved for international efforts. It has been argued that greater investment in pandemic influenza preparedness abroad could enhance domestic pandemic preparedness efforts. Of the $7.1 billion requested, $200 million is made available for HHS to bolster international surveillance capacity; $131.5 million for USAID to implement avian influenza containment efforts globally; an additional $18.5 million for the State Department for avian flu and pandemic preparedness activities in diplomatic arenas, $20 million for the potential evacuation of U.S. government personnel and their dependents in the event of a pandemic; and $18.3 million for the Department of Agriculture to provide technical assistance in international animal surveillance.[12]

The U.S. Department of State is responsible for coordinating the U.S. international response to the global spread of H5N1. Ambassador John Lange replaced Ambassador Nancy Powell as the Senior Coordinator for Avian Influenza and Infectious Diseases in March 2006. Ambassador Lange is responsible for overseeing the work of the technical implementing agencies: HHS (and its relevant agencies), USAID, the Department of Agriculture, and the Department of Defense.

Prior to 2005, U.S. agencies had been enhancing laboratory capabilities, training health care providers, strengthening surveillance systems, and developing influenza pandemic plans. Through the FY2005 emergency appropriations, Congress directed U.S. agencies to revisit international influenza initiatives and ensure that there was a coordinated response to the global spread of H5N1. USAID and HHS (including its relevant agencies) undertook country planning visits to Vietnam, Cambodia, and Laos. After the trip, the team outlined in a report[13] a number of factors that have complicated efforts to contain the spread of H5N1 in those countries, which included:

- Between 70% and 80% of poultry in the three countries are raised in small backyard farms, hindering national governments' ability to ensure health standards.

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[11] For more information on U.S. government avian flu and pandemic preparedness see [http://www.pandemicflu.gov]

[12] FY2006 Emergency Request for Avian and Pandemic Influenza Preparedness. [http://www.whitehouse.gov/omb/budget/amendments/supplemental_11_01_05.pdf]

[13] Report from Country Planning Visits, "U.S. Government Emergency Response to Avian Influenza: A Plan of Action for Vietnam, Laos, and Cambodia." July 11-24, 2005. This report was provided to CRS by USAID.

- Between 50% and 80% of poultry die from other avian infections, complicating efforts to identify unusual die-offs, and limiting farmers' likelihood of reporting bird deaths to authorities.

- Although culling is an essential element of controlling the spread of H5N1, poorer countries can not afford to systematically compensate farmers for lost stock, which also increases reluctance to report signs of infection.

- Wild birds and domesticated ducks are H5N1 reservoirs.

- Low levels of awareness exist among local farmers.

- There is little pandemic preparedness activity in the countries toured.

- The capacity to monitor and respond effectively to animal outbreaks is limited. Veterinary services are inadequate to deal with the scope, severity, and rapid spread of H5N1 epidemics, which has resulted in the disease becoming increasingly endemic among animal populations in the region. The lack of human resources for disease surveillance, diagnostics, and response also severely limits the capacity of human health systems, and continued human infections of avian influenza threaten to overburden already fragile public health infrastructures.

The report also included an action plan, which outlined the activities that each agency would implement. The agency-specific strategies are briefly described below.

Department of State

On September 14, 2005, President Bush announced the International Partnership on Avian and Pandemic Influenza (IPAPI) at the U.N. General Assembly High-Level Plenary Session. Through IPAPI, the U.S. government seeks to enhance public health and surveillance capacity through diplomatic initiatives that promote transparency and encourage reporting and rapid sharing of samples. IPAPI seeks to generate and coordinate political momentum and action for addressing the threats of avian and pandemic influenza based on a set of core principles. The principles are focused on enhancing preparedness, prevention, response, and containment activities (see Table 4). The Partnership brings key nations and international organizations together to improve global readiness by:

- elevating the issue of avian and pandemic influenza preparedness to the national level;
- coordinating efforts among donor and affected nations;
- mobilizing and leveraging resources;
- increasing transparency in disease reporting and surveillance; and
- building capacity to identify, contain, and respond to pandemic influenza.

The State Department works closely with regional organizations, including the Association of Southeast Asian Nations (ASEAN) and the Asia Pacific Economic Cooperation (APEC) forum, to address avian influenza and the threat of an influenza pandemic. The work includes efforts to encourage comprehensive national pandemic preparedness plans that address the multi-sectoral impacts of an influenza pandemic.[14] The next IPAPI meeting is scheduled for June 2006.

In the FY2006 supplemental request, the President proposed that the State Department receive $38.5 million in FY2006 for international response coordination; diplomatic outreach; exchanges of U.S. and foreign medical personnel; and for avian and pandemic influenza health support and protection of U.S. government employees and families at U.S. missions overseas. About $20 million of those funds would be reserved for the potential evacuation of U.S. government personnel and dependents from overseas missions. OMB reports that in FY2006, $6 million of the funds were spent on diplomatic support and international response coordination and $25 million were spent on health support for embassy and evacuation contingency for overseas missions. The Administration did not request additional funds in FY2007 for State Department international avian flu activities.

U.S. Agency for International Development (USAID)

USAID coordinates its global H5N1 and influenza response with other U.S. agencies. It also works closely with WHO, the Food and Agriculture Organization of the United Nations (FAO), and other international governments and organizations to support national influenza and H5N1 prevention efforts. USAID reports that it has allocated $22.1 million to global avian flu prevention and containment during FY2005 ($16.3 million of which was funded through the FY2005 emergency appropriations).[15] USAID has received $131.5 million from FY2006 emergency supplemental appropriations for global avian flu efforts. The FY2007 budget request allocates $55 million to USAID for continued avian flu and pandemic preparedness initiatives abroad. Specifically, the agency has:

- strengthened disease surveillance, laboratory diagnosis, and rapid containment of animal outbreaks in Cambodia, China, Indonesia, Laos, and Vietnam;

- supported communication campaigns in Laos, Cambodia, Vietnam, and Indonesia aimed at reducing animal handling practices that place humans at risk;

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[14] The State Department also implements influenza pandemic preparedness initiatives through the Office of International Health Affairs (OES/IHA), which works with agencies throughout the U.S. government to facilitate policy-making regarding bioterrorism and health security, environmental health, infectious diseases (e.g., SARS, Avian Influenza, Pandemic Influenza, Polio), health in post-conflict situations, and surveillance and response. [http://www.state.gov/g/oes/c1874.htm].

[15] USAID Avian Flu Update #29, February 9-March 13, 2006. [http://www.usaid.gov/our_work/global_health/home/News/news_items/actions.html].

- distributed some 10,000 personal protective equipment (PPE) sets, which include manual sprayers to assist in decontaminating hospital rooms and equipment, Tyvek suits (protective coveralls used in hazardous situations), gloves, boots, masks, and eye protection in Cambodia, Thailand, Laos, Vietnam, and Indonesia;

- shipped 2,000 sets of PPE for first responders and animal cullers in Nigeria;

- mobilized an emergency shipment of 2,000 PPE sets for first responders within 48 hours of confirmation of H5N1 in Niger;

- deployed infectious disease and animal health experts to Iraq, Turkey, Ukraine, Romania, Armenia, Azerbaijan, Georgia, Moldova, and Nigeria to provide short-term technical assistance, assisted in the rapid collection of animal samples and helped implement procedures to strengthen surveillance and containment efforts in the countries;

- provided Ukraine PPE kits that two veterinary laboratories and cullers and first responders from the Ministry of Emergencies are using in their response and containment activities;

- granted WHO $300,000 for international coordination efforts and for improving disease control and surveillance measures; and

- provided WHO an additional $250,000 for PPE.

U.S. Department of Health and Human Services (HHS)

CDC is the key agency at HHS responsible for implementing U.S. anti-influenza activities around the world. The Coordinating Center for Infectious Diseases and the Field Epidemiology Training Program — a CDC-sponsored activity — are also critical components of HHS global pandemic preparedness initiatives. Activities with foreign governments or populations include pandemic preparedness and planning; training in avian influenza surveillance; laboratory safety and skills instruction; epidemiology training; developing and training rapid response teams; stockpiling support; and deployment of expert disease control teams.

A significant part of H5N1 and pandemic influenza planning is funded through the Global Disease Detection (GDD) Initiative at CDC. GDD aims to recognize infectious disease outbreaks faster, improve the ability to control and prevent outbreaks, and detect emerging microbial threats. In FY2006, HHS enhanced its international pandemic research activities. Research activities included assisting in the development and testing of candidate vaccines and drugs produced by Vietnam and other countries with endemic avian influenza; expanding the clinical trials infrastructure and research in southeast Asia; conducting human-animal interface studies, including disease surveillance among animals in the region; and expanding

other research to accelerate the development of pandemic influenza vaccines, drugs, and diagnostics.[16]

In 2005, CDC expanded its GDD activities by creating new sites, improving early warning systems, researching new viral strains, and supporting international organizations. CDC estimates that in FY2005, it spent approximately $21 million on activities related to international influenza through both its Infectious Diseases Control and GDD programs, of which $15 million was provided through emergency appropriations. OMB reports that HHS spent $114 million on international avian flu initiatives through FY2006 emergency supplemental appropriations. The Administration requests $145 million for HHS global pandemic influenza and preparedness initiatives in FY2007.

Department of Agriculture (USDA)

U.S. Department of Agriculture (and its related agencies)works closely with other U.S. agencies on the ground, as well as other international organizations to help nations take steps to address and control the spread of avian influenza. Dr. Ron DeHaven, Administrator, Animal and Plant Health Inspection Service (APHIS) of USDA stated that addressing avian flu at its source — in affected poultry abroad — and participating in international eradication efforts provide the best opportunity to reduce or eliminate the risk of an H5N1 pandemic.[17] In that view, USDA and other analysts consider the department's efforts a critical element in the global fight against the spread of H5N1.

Through FY2006 emergency supplemental appropriations, Congress directed $91.3 million to USDA for avian flu and pandemic preparedness initiatives, of which $18.3 million was reserved for international initiatives. The funds were allocated as follows:

- $8.0 million for wildlife, poultry and swine surveillance and diagnostics;
- $1.75 million for biosecurity enhancement through education and information;
- $1.05 million for technical assistance through training and avian movement control;
- $3.8 million for training and education related to industry changes and food safety planning;
- $1.05 million for training and education regarding poultry destruction and disposal methods;
- $0.6 million for testing and evaluation of vaccine formulations; and
- $2.1 million for in country expertise for longer term assistance.

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[16] HHS FY2007 budget request.
[http://www.hhs.gov/budget/07budget/2007BudgetInBrief.pdf]

[17] USDA, Transcript of Technical Briefing regarding Avian Influenza. October 26, 2005. [http://www.usda.gov/birdflu]

The FY2007 Administration budget request includes $5 million for USDA international avian flu initiatives.

Department of Defense (DoD)

The Department of Defense Global Emerging Infections System (GEIS) delivers health care to American armed forces around the globe.[18] GEIS has a network of overseas medical research laboratories that track, prevent, and treat infectious diseases around the world. The objective is to protect the U.S. military and strengthen its ability to address the challenges related to a potential pandemic influenza, including compromised military force health and readiness. GEIS is also a critical partner in the WHO's Global Outbreak Alert and Response Network (GOARN) (described below). Key DoD-GEIS activities to combat the spread of H5N1 and prepare for an influenza pandemic have included:

- providing a DoD staff veterinarian to serve as a member of the WHO GOARN Team in Laos, and to conduct training workshops in detecting and diagnosing avian flu cases;

- placing a U.S. Navy microbiologist at the Institute Pasteur in Ho Chi Minh City, Vietnam, to hold training sessions on rapid diagnostic test methodology;

- monitoring and preventing infectious disease emergence in southeast Asia through its Armed Forces Research Institute of Medical Sciences (AFRIMS).[19]

The Naval Medical Research Units (NAMRU) are another critical part of DoD's avian flu containment and pandemic preparedness efforts. NAMRU supports the GEIS mission through four programs: emerging diseases, enteric diseases, parasitic diseases, and virology. NAMRU are overseas research laboratories based in Egypt, Indonesia, and Kenya, which collect and analyze viral samples. NAMRU has been critical in U.S. government H5N1 surveillance efforts. DOD also maintains related research activities in Southeast Asia and the Pacific Islands, and supports a satellite laboratory in Phnom Penh, Cambodia, in collaboration with the Cambodian National Institute of Public Health. Key activities include:

- bolstering local, national, and regional diagnostic and epidemiological capacity;

- assisting in the development of new surveillance strategies, such as the novel syndromic surveillance initiative Early Warning Outbreak Recognition System (EWORS);

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[18] GEIS website, [http://www.geis.fhp.osd.mil/].

[19] DoD, Global Emerging Infections System Annual Report Fiscal Year 2004. [http://www.geis.fhp.osd.mil/GEIS/aboutGEIS/annualReports/GEIS_AR_04.pdf].

- implementing a comprehensive influenza surveillance project in Indonesia, which provides prevalence data and temporal, genotype data of circulating strains;

- collaborating with CDC in its FY2005 and FY2006 global influenza activities; and

- facilitating the transformation of outbreak response structures into more effective, multidisciplinary, centrally directed ones.[20]

OMB reports that DoD spent $10 million in FY2006 on worldwide avian flu surveillance and assistance to military partner nations. The Administration requests $10 million for international avian flu efforts in FY2007.

International Response[21]

Overview of the Role of the World Health Organization

The World Health Organization, established in 1948, is the U.N. system's authority on international public health issues. It assists governments to improve national health services and establish worldwide standards for foods, chemicals, and biological and pharmaceutical products. WHO concentrates on preventive rather than curative programs, including efforts to eradicate endemic and other widespread diseases, stabilize population growth, and improve nutrition, sanitation, and maternal and child care. WHO works through contracts with other agencies and private voluntary organizations. The United States has been a member of WHO since its inception.

WHO is a central actor in the global response to the outbreak of H5N1 avian influenza. WHO seeks to mitigate the risks avian influenza and infectious diseases pose to international public health, and to assure the availability of appropriate containment mechanisms, particularly since global travel has become the primary means of spreading disease around the world. With the exception of SARS and HIV/AIDS, H5N1 is viewed by some as the most serious challenge facing WHO.

WHO's Global Health Security

The Epidemic and Pandemic Alert and Response system is a critical part of WHO's global health security plan. Key aspects of the program include:

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[20] DoD, Global Emerging Infections System Annual Report Fiscal Year 2004. [http://www.geis.fhp.osd.mil/GEIS/aboutGEIS/annualReports/GEIS_AR_04.pdf].

[21] This section prepared by Rhoda Margesson and Tiaji Salaam-Blyther, Analysts in Foreign Affairs.

- The Alert and Response Operations: systematically track the development of diseases, share and disseminate information, and coordinate rapid outbreak response and logistics.

- The Global Outbreak Alert and Response Network (GOARN): provides an operational framework and aims to create a standardized international outbreak response system through 112 institutions and networks of people and technical resources.[22]

- The Global Public Health Intelligence Network (GPHIN): tracks Internet communications through a customized search engine, which effectively picked up telecommunicated alerts in China during the SARS outbreak. WHO also uses the system to clarify or refute information that may create disruption or panic.

WHO Global Influenza Preparedness Plan[23]

In September 2005, U.N. Secretary-General Kofi Annan appointed Dr. David Nabarro as the Senior U.N. System Coordinator for Human and Avian influenza. Dr. Nabarro, seconded from the WHO, is responsible for coordinating the avian influenza containment efforts of various U.N. agencies. Dr. Nabarro is also tasked with encouraging global support and implementation of the WHO Global Influenza Preparedness Plan. The plan outlines WHO goals and actions, as well as recommended actions for individual nations at each pandemic phase. The plan contains an annex of recommendations to nations for "non-pharmaceutical public health interventions," such as isolation, quarantine and travel restrictions. The annex stresses the use of voluntary rather than compulsory measures. Additionally, it stresses that nations implement infection-specific responses, noting the lack of demonstrated utility of certain practices. For example, certain SARS control measures, such as temperature screening at airports, would not be expected to effectively control influenza spread.[24]

WHO has requested $150 million to establish a global stockpile of influenza vaccines and treatments. WHO officials underscore that wealthy and poor countries must develop pandemic preparedness plans collectively to reduce national and international viral transmission. The organization envisions using the stockpile to arrest a potential pandemic by containing the virus at the first sign of an outbreak. In the event of an outbreak, WHO asserts that a pandemic could potentially be averted

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[22] For more information on the Global Outbreak Alert and Response Network, see [http://www.who.int/csr/outbreaknetwork].

[23] The WHO influenza pandemic preparedness Home Page is at [http://www.who.int/csr/disease/influenza/pandemic/en/index.html].

[24] See WHO, Department of Communicable Disease Surveillance and Response Global Influenza Programme, "Responding to the Avian Influenza Pandemic Threat: Recommended Strategic Actions," WHO/CDS/CSR/GIP2005.8.

if antiviral drugs were quickly distributed in a poor country without access to them.[25] To date, countries have pledged between $20 million and $30 million to fund the stockpile. Roche, the patent holder of Tamiflu, announced that it would donate three million courses of the drug to WHO[26]. The company estimates that the three million courses would be ready before mid-2006. On January 17, 2006, WHO announced that Roche would donate an additional two million treatment courses of Tamiflu for use in developing countries — bringing the total of donated courses to five million.[27]

Similarly, the U.N. General Assembly has established an emergency fund — Central Emergency Response Fund (CERF) — to provide quick initial funding during the early stages of emergencies and to minimize extra costs related to funding delays. CERF was formerly launched in March 2006. The U.N. aims to have a $500 million revolving budget that could be used within three to four days of the start of an emergency. To date, the United Nations has received $225 million for the fund.[28]

International Health Regulations

An outbreak of infectious diseases raises many public health questions including the application of international law, particularly as it affects three main areas — International Health Regulations (IHR); public health measures and civil and political rights; and principles of state responsibility.[29] This section will focus on the IHR because of its relevance to WHO.

On May 23, 2005, the World Health Assembly revised the IHR, adding novel influenza strains (those with pandemic potential) and SARS to the list of "notifiable diseases" that WHO urges countries to report. In addition, the revised IHR include a provision requiring notification of "events of international concern." This mechanism could strengthen WHO's ability to address emerging diseases, because it requires member States to report unusual health events whether or not they are attributable to a known pathogen. The updated IHR also include expanded requirements for disease surveillance and control activities at points of international travel (airports, border crossings, etc.), and urge developed countries to assist

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[25] WHO, "Donation of three million treatments of oseltamivir to WHO will help early response to an emerging influenza pandemic." August 24, 2005. [http://www.who.int/mediacentre/news/releases/2005/pr36/en/index.html].

[26] Roche, "Roche donates 3 million treatments of antiviral Tamiflu to the WHO for use in an influenza pandemic." August 24, 2005. [http://www.roche.com/med-cor-2005-08-24]

[27] WHO, "Additional two million treatment courses of oseltamivir donated to WHO to help countries which cannot afford the treatment." January 17, 2006. [http://www.who.int/mediacentre/news/notes/2006/np01/en/index.html]

[28] United Nations, "CERF launch promises immediate impact." March 10, 2006. [http://www.irinnews.org]

[29] The American Society of International Law, *SARS and International Law,* April 2003, see [http://www.asil.org/insights].

developing countries to gain the capacities needed to meet the new disease control guidelines.[30]

The revised IHR are to replace the existing IHR (adopted in 1969) on June 15, 2007, when the revised regulations come into force. Considered an international legal instrument, the revised IHR will be binding on all WHO member States who have not stated a reservation or rejected them altogether, and on non-member States that have notified the Director-General of WHO that they agree to be bound by the revised IHR.[31] Between now and June 2007, WHO and Member States may take concrete steps towards implementation of the revised IHR and to improve their capacity to respond to international health risks and emergencies.[32] The revised IHR do not include an enforcement mechanism. However, for states to respond appropriately and avoid potentially harmful consequences, much of the encouragement to comply will likely come from international pressure, as the SARS outbreak demonstrated.

At the Executive Board's semi-annual session, from January 23-28, 2006, the Board discussed a number of issues, including how to reduce the risk of a global influenza pandemic. During the 117th Session, the Board discussed strategies to encourage countries to immediately voluntarily comply with provisions of the revised IHR related to a possible flu pandemic. Member countries, such as Canada, are reportedly among those who advocate for the revised IHR to be adopted earlier than 2007.[33] Dr. Lee Jong-wook, WHO Director General, argued that the recent spread of the virus to Turkey has demonstrated that immediate voluntary compliance with selected provisions of the revised IHR are urgent.[34] During the session, the 32 Board Members backed and released *WHO Pandemic Influenza Draft Protocol for Rapid Response and Containment.* The draft protocol must be ratified by the General Assembly in May 2006. The protocol seeks to "facilitate rapid detection and assessment of potential 'signals' that the virus is improving its transmissibility, and to guide implementation of effective response interventions before an emerging pandemic virus has spread beyond an initial outbreak zone."[35] Former Ambassador

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[30] The revised International Health Regulations, approved by the World Health Assembly on May 23, 2005, are available at [http://www.who.int/csr/ihr/en/].

[31] If a State makes a reservation that is compatible with the "object and purpose of IHR (2005)" and at least one-third of other States have not objected to the reservation within six months of notification, the revised IHR will enter into force for that State, subject to its reservation. WHO, "Frequently Asked Questions About IHR." [http://www.who.int/csr/ihr/howtheywork/faq].

[32] WHO, "Frequently Asked Questions About IHR." [http://www.who.int/csr/ihr/howtheywork/faq].

[33] Nebehay, Stephanie, "*WHO backs early adoption of bird flu rules.*" Reuters, January 26, 2006. [http://www.alertnet.org/thenews/newsdesk/L26248393.htm]

[34] WHO, "*Report by the Director-General to the Executive Board at the 117TH Session.*" January 23, 2006. [http://www.who.int/dg/lee/speeches/2006/eb_117/en/index.html]

[35] WHO, "WHO Pandemic Influenza Draft Protocol for Rapid Response and Containment." January 27, 2006.

(continued...)

Nancy Powell stated at a House Foreign Operations subcommittee hearing that the U.S. is working with countries to help them comply with the IHR. Ambassador Powell pointed out that in the Caucuses there is a lack of boxes used for sending viral samples to WHO, and a lack of information on how to adhere to the IHR. Various U.S. government agencies are reportedly working with countries to demonstrate how to safely handle and transport viral samples to WHO.

Role of Other International Health Organizations

The U.N. Food and Agriculture Organization coordinates global surveillance and response activities for animal influenza strains with pandemic potential, such as H5N1.[36] To accomplish its mission, FAO works closely with the World Organization for Animal Health, known by its French acronym, OIE.[37] Rapid detection of avian influenza outbreaks is key to controlling the disease both in poultry and in people, and is therefore key to preventing and controlling a potential influenza pandemic. FAO, OIE, and WHO work closely to prevent and respond to the threat of an avian influenza pandemic. FAO has spent $7.5 million on H5N1 initiatives since 2004. USAID is granting the U.N. organization $6 million, and the German government has pledged $20 million for 2005 and 2006 activities.[38] FAO is requesting an additional $175 million from the international community, due to the rapid global spread of H5N1.

The World Bank provides low-interest loans to countries heavily affected by H5N1. Additionally, the Bank coordinates efforts between countries, and encourages them to develop pandemic plans that connect sectors, such as health and rural development. In September 2005, representatives from the WHO, FAO, OIE and the World Bank met with health experts from the United Nations, European Commission and H5N1-affected countries to discuss the global spread of H5N1, to emphasize the importance of pandemic planning, and to prepare a coordinated response. On November 4, 2005, the World Bank announced that it would provide $500 million in loans to poor southeast Asian countries that are struggling to combat avian influenza. The funds will be used to supplement government resources, strengthen veterinary systems, and assist in culling and animal vaccination programs.[39] Although the World Bank has agreed to provide $500 million in loans to affected countries, the Bank estimates that $1 billion could be needed over the next three

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[35] (...continued)
[http://www.who.int/csr/disease/avian_influenza/guidelines/RapidResponse_27%2001.pdf]

[36] See FAO avian influenza home page at [http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html].

[37] See OIE avian flu home page at [http://www.oie.int/eng/AVIAN_INFLUENZA/home.htm]

[38] Interview with FAO official, October 31, 2005.

[39] World Bank Press Release, "New Global Program to Deal with Avian Flu." November 4, 2005. [http://www.worldbank.org]

years.[40] The $1 billion does not include the cost of financing human or animal vaccine development, purchasing antiviral medicine, or compensating farmers for loss of income.

On January 17-18, 2006, the World Bank, the European Commission, and the Chinese government co-hosted the "International Pledging Conference on Avian and Human Influenza." The conference's stated goal was to raise between $1.2-$1.4 billion from the global community to combat avian flu in developing and middle-income countries.[41] Representatives from approximately 100 countries and 20 international organizations attended, ultimately pledging $1.9 billion in avian flu assistance.

Details on how the money will be spent are scant; however, David Nabarro, the U.N. bird flu coordinator, stressed that "there will be very clear procedures for the monies being applied to particular programs." Among the donors, the World Bank reportedly promised $500 million, the U.S. pledged $334 million, Japan offered $159 million, EU member states donated $138 million, and the European Commission, the EU's executive body, pledged $121 million. Although China is struggling to contain the spread of H5N1, it pledged $10 million.[42] It is anticipated that $635.2 million would go to East Asia and the Pacific, $224.6 million to Eastern Europe and Central Asia, $147.1 million to Africa, $110.1 million to the Middle East and Africa, $76.0 million to South Asia, and $9.2 million to Latin America and the Caribbean.[43]

The World Bank has already begun plans for distributing the $1.9 billion raised. In February 2006, the World Bank announced that it would provide the Kyrgyz Republic $4 million, the first of the $500 million in avian flu assistance grants. The grant is intended to support national efforts to strengthen veterinary services, enhance information dissemination, and improve disease surveillance.[44] The World Bank also announced in February that it is planning to provide $50 million in emergency funds to Nigeria for culling and farmer compensation, as well as vaccination assistance.[45]

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[40] UN News Service, "Bird flu: UN-sponsored conference draws up six-point action plan." November 9, 2005. [http://www.un.org/apps/news/]

[41] "Avian and Human Influenza: Financing Needs and Gaps," World Bank, January 12, 2006, pp. 10-11. [http://siteresources.worldbank.org/PROJECTS/Resources/40940-1136754783560/AHIFinancingGAPSFINAL.pdf]

[42] Information in this paragraph was compiled from the Wall Street Journal, "*Donors Pledge $1.9 billion to Fight Avian Flu in Developing Nations.*" January 19, 2006. [http://www.wsj.com]

[43] BBC, "*$1.9bn pledged for bird flu fight.*" January 18, 2006. [http://news.bbc.co.uk/go/pr/fr/-/1/hi/world/asia-pacific/4622982.stm]

[44] World Bank press release, "First World Bank Avian Flu Grant to Kyrgyz Republic." February 9, 2006. [http://www.worldbank.org]

[45] World Bank press release, "Emergency Aid for Nigeria to Combat Avian Flu." February 24, 2006. [http://www.worldbank.org]

Affected Countries' Response

Degree and sophistication of preparation for avian influenza vary widely among the affected countries. The more affluent governments have undertaken more extensive measures as well as committed national resources to hedge against the risk of a pandemic. Japan and Taiwan have reportedly both accumulated stockpiles of Tamiflu and are preparing to manufacture their own supply. Singapore has reportedly stockpiled antivirals for 10% of its population, enhanced surveillance, and put a detailed contingency plan in place. WHO officials praised an exercise run by South Korea which simulated how the government would respond to an outbreak.[46] On the other hand, the closed governments of Burma (Myanmar) and North Korea offer little reliable information about the presence of bird flu within their borders. Although both Yangon and Pyongyang have provided limited cooperation with international organizations, outbreaks within their borders could constitute a weak link in the event of a pandemic.

In February 2006, the OIE reported a spike in the number of countries confirming the H5N1 virus in birds, all outside of the Asia epicenter.[47] March saw another up-tick, with the total number of countries with confirmed cases in birds approaching 50. The detection of the flu in several European countries prompted a meeting of EU agricultural ministers, but representatives were unable to agree on a coordinated response, with some states urging aggressive measures such as widespread commercial poultry vaccination and others fearful of the economic consequences. The European Commission approved the use of vaccinations for France and the Netherlands to protect their large poultry industries. Cases in birds were confirmed in Nigeria and India, both countries with poor public health care infrastructure and lack of veterinary systems, surrounded by countries with even less capacity to cope with a widespread outbreak. With new cases also appearing in the Middle East and Central Asia, international concern grew about the scope of a potential pandemic.

The profiles below focus primarily on countries that have had WHO-confirmed cases of human infection. Although neither Russia nor any African countries have had confirmed human cases to date, updates are included because of the crucial geographical link that the countries represent. Human H5N1 deaths in Turkey and Iraq in 2006 represented the first confirmed deaths outside of Asia. Iraq is not included in this section as available information is scant. National health officials in Egypt announced cases of human infection in March 2006, but the cases have not yet been confirmed by the WHO. On March 21, 2006, the WHO confirmed seven cases and five deaths from H5N1 in Azerbaijan. More detailed information on the response by Azerbaijan will be included in the next update.

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[46] "The Front Lines in the Battle Against Avian Flu Are Running Short of Money," *New York Times*. October 9, 2005.

[47] OIE, Update on Avian Influenza in Animals, January 26, 2006. [http://www.oie.int/]

Africa[48]

As of March 21, 2006, the presence of HPAI H5N1 in poultry had been confirmed in three sub-Saharan African countries: Nigeria, Niger, and Cameroon. No human cases had been confirmed in the region. The outbreak in Nigeria is seen as notable because Nigeria is the most populous country in Africa[49] and because it is seen as a likely source of the H5N1 detected in Niger and Cameroon.

H5N1 in Nigeria. On February 7, 2006, OIE/FAO confirmed the presence of H5N1 in caged chickens and other birds on a commercial farm in Nigeria's northern Kaduna state after tests by Nigerian officials proved positive for H5N1. Subsequent H5N1 outbreaks in poultry on farms in multiple states, initially in the north, have been reported. U.S. officials in Nigeria reported that H5N1 was spreading rapidly in poultry and that resulting bird mortality rates were high. The Kaduna outbreak reportedly began weeks before H5N1 was detected. Large numbers of poultry had died from unidentified causes in preceding weeks, prompting the initial Nigeria testing.[50]

Nigeria's Response. Nigerian authorities responded to the detection of H5N1 by quarantining affected farms, destroying suspected infected birds, and testing poultry and people who have close contact with poultry on commercial farms. Policies call for all birds within three kilometers of each infected site to be culled — though this was reportedly not taking place in all instances — and for presumptive H5N1 cases to be treated as actual cases, pending testing. National and state authorities formed integrated response teams, though initially, national ministries (primarily Health and Agriculture) reportedly coordinated their H5N1 responses separately. Officials have launched public information campaigns providing safety and education messages about bird flu and advising the public to report bird deaths, and have begun to compensate farmers for losses due to H5N1 control measures. Culling, however, reportedly began before compensation policies had been developed, and compensation being offered is reportedly substantially below market-value losses and is not being distributed evenly. In part due to lack of government capacities, only the owners of large commercial farms subject to losses as a result of ordered culls undertaken by government veterinary teams are reportedly receiving compensation, though such farms are the reported source of only 25% of Nigerian poultry production. Small-scale poultry owners, who produce 60% of poultry, are reportedly not being compensated, and there is no compensation for birds that die naturally of H5N1.[51] Extensive sell-offs of poultry nationwide by bird owners seeking to minimize potential economic losses followed the reported detection of H5N1. In

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[48] This section prepared by Nicolas Cook, Specialist in African Affairs.

[49] Nigeria, just over twice as large as California, has between an estimated 128.7 million (U.S. Census, 2005) and 139 million people (World Bank, 2004). For general background, see CRS Issue Brief IB98046, *Nigeria in Political Transition*.

[50] OIE, FAO, and WHO press releases; multiple U.N. IRIN, AFP, AP, and other news reports, Feb 2006; and USAID information. The origin of H5N1 in Nigeria has not been determined; see "Transmission" section, above, for further information on this issue.

[51] IRIN, "Nigeria: Poorest forgotten in bird flu compensation pay-outs," Mar. 9, 2006.

response, in order to prevent the further spread of the disease, officials tried to ban sales and intra-state trade of poultry, but with reportedly mixed results. International experts found that such efforts were not being implemented uniformly or completely. Joint federal-state Nigerian healthcare teams are testing suspected H5N1-exposed persons, such as poultry workers. Such testing has reportedly been stymied by lack of bird flu testing kits (only symptoms of flu and respiratory infections were initially being checked) and lack of knowledge by those being tested about what would happen if they test positive for H5N1. Some are said to fear detainment. Nigeria requested international aid in the form of protective clothing and disinfectants.[52]

U.S. and International Responses. Upon confirmation of H5N1 in Nigeria, the CDC banned U.S. imports of poultry from Nigeria. U.S. officials are working with the Nigerian government to create an integrated, national H5N1 action plan and prioritized lists of needs for donors. The United States sent 2,000 Personal Protective Equipment units (PPE, external protective garment and disinfectant kits, supplied by USAID) to Nigeria and dispatched a CDC-led technical team that arrived in Nigeria on February 14. It set up a mobile rapid diagnosis laboratory and was evaluating Nigerian laboratory testing capacities and potential upgrade needs, among other activities. The United States is responding with technical advice, supplies, or other aid on an as-needed basis, as information on the outbreak develops. The U.S. embassy in Abuja has formed an inter-agency avian flu working group, and is working with other international donors and the Nigerian government to respond to the outbreak. Provisional USAID plans call for a quick-impact, 30-day program focused on containment and culling, prevention, eradication, and recovery. USAID has also drafted plans for longer-term assistance and has deployed a veterinarian, an expert in agricultural policy and strategy, and a communications/behavioral change specialist to Nigeria. USAID's Nigeria mission provisionally plans to use about $9 million in unobligated funds to support its H5N1-related activities. In addition to assisting Nigeria, U.S. embassy officials are assessing the potential need for protecting U.S. personnel as they respond to H5N1 in Nigeria, notably in the eventuality that human infections are detected, or if the virus becomes transmissible from human to human.[53]

CDC officials are working closely with the FAO,[54] OIE, and WHO in Nigeria, assisting with testing for H5N1, and providing virus control and public health policy advice and other technical assistance. These international agencies have called for an intensification of measures that Nigerian officials are already implementing, such as quarantining affected sites, culling infected flocks, undertaking disinfection and hygiene measures, and closing poultry markets in affected states. The WHO has offered to aid Nigeria's public information efforts and to provide assessment teams and H5N1 testing, prevention, and logistical aid, in coordination with ongoing WHO-

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[52] IRIN reports, Feb. 2006; AFP, "Nigerian bird flu..."; Olukayode Oyeleye, et al, "Suspected Infected Kids Test Negative to Bird Flu," *Guardian* [Nigeria], Feb. 15, 2006; BBC News, Nigeria Bird Flu Plan 'Failing,' Feb. 14, 2006; and FAO/OIE, "Step Up of Surveillance and Border Controls in Africa," Feb. 10, 2006.

[53] Press accounts and U.S. government information.

[54] The FAO has allocated about US $1 million to support surveillance and control activities in 20 West and North African countries.

backed national polio immunization efforts. WHO has provided 10,000 doses of Tamiflu to Nigeria and plans to deliver 250,000 doses. The U.N. office in Nigeria is facilitating frequent donor coordination meetings, and the World Bank has provisionally agreed to provide up to $50 million in emergency credit to help Nigeria to counter H5N1, possibly through a poultry vaccination campaign. The UK has reportedly provided 15,00 PPE units to Nigeria.[55]

Regional Context. H5N1 has been confirmed in Niger and Cameroon in areas along the northern Nigerian border, which is known to be porous and often minimally controlled. The virus was initially detected in farm ducks in both countries, but has affected other types of poultry. USAID's West Africa Regional Program (WARP), located in Accra, Ghana, is responding to the outbreak in Niger. It is focusing on promoting avian flu prevention messages; USAID has deployed a communications expert to assist with Niger's avian flu response. USAID is also working with the U.S. embassy in Niger to dispatch a U.S. team to Niger, in coordination with FAO, to aid in the further development of a Nigerian emergency H5N1 response plan, and to provide related technical assistance. Limited funding will be programmed toward FAO-led efforts to combat the spread of H5N1. USAID has sent 2,000 Personal Protective Equipment (PPE) kits to Niger for use in culling and/or sampling of birds, and is coordinating the U.S. response with other U.S. and international agencies, such as CDC and WHO. Two CDC epidemiologists working on other health issues in Cameroon are monitoring H5N1-related developments there, though they are not formally tasked with responding to H5N1, in concert with U.S. embassy, Cameroonian government, and international officials. USAID is dispatching PPE kits and has provisionally programmed $200,000 to aid Cameroon's government in its response to the virus.

Multiple African countries banned imports of poultry from Nigeria after H5N1 was reported there and many have implemented measures, in many cases starting several months ago, to monitor and detect outbreaks in their territories, and to monitor imports of poultry, in line with advice from OIE, WHO, and FAO. In January 2006, at the 24th FAO Regional Conference for Africa in Mali, 18 West African countries reportedly discussed bird flu contingency planning. In late February, 12 West African countries agreed to launch a coordinated regional effort to counter H5N1, to include the creation of a joint tracking committee and a group of experts tasked with drafting a regional avian flu response. They also discussed creation of an African Development Bank-based emergency regional H5N1 intervention fund. Southern African Development Community (SADC) and African Union (AU) health experts attended a USAID-supported, FAO and WHO-hosted expert conference, held February 28-March 3 in South Africa, to assess regional avian flu preparedness. Conferees found that all participating countries had created national H5N1 preparedness plans. Most, however, lacked adequate resources, notably for surveillance and veterinary and human health service responses, required for fully implementing them — though many had begun to do so, and their capacities varied widely. Many said that they lacked information about how to access donor funds pledged for H5N1 preparedness (see section herein, *International Avian Flu Conference in Beijing, January 17-18, 2006*). There are reportedly four African

[55] FAO, OIE, and WHO press releases and statements; and U.S. government information.

countries with laboratories in Africa that are part of the WHO Global Influenza Network and are able to diagnose H5N1. Lab personnel from several other countries are being trained to detect H5N1, and labs in several other countries reportedly possess trained workers but lack adequate equipment and supplies.

In October 2005, the WHO issued an H5N1 risk assessment for Africa. It found that "there are multiple opportunities for human exposure" to H5N1 in Africa, mostly associated with widespread domestic poultry husbandry, processing, and consumption. It noted that domestic poultry in Africa typically run free, "often mingle freely with wild birds," and that close domestic human-poultry contact is common. Were even a few human cases to occur, technically weak and resource-poor public health systems already overburdened by AIDS, tuberculosis and malaria, WHO found, would face "enormous new challenges." Early detection and drug treatment would likely be inaccessible to most affected people. A severe lack of disease surveillance, assessment, and specialized treatment capacities, it stated, might both imperil local H5N1 containment and result in a failure to discover "critical early warning" signs of potential H5N1 mutations that might facilitate its global transmissibility. WHO also suggested out that African governments' frequent lack of resources to compensate farmers for poultry lost to culling might discourage "early and open reporting," increasing chances that H5N1 might become endemic.[56] The reported frequent weakness of African veterinary services could also hinder responses to H5N1 in Africa, according to some observers.

Cambodia[57]

Between February and April 2005, four Cambodians were confirmed to have died from the H5N1 avian flu virus. All four victims lived in Kampot province, an area where 600 poultry reportedly had fallen ill and died in March 2005. Despite warnings, many villagers ate birds that had been sick because food is not plentiful. Health experts predict that more cases in Cambodia are likely, though the WHO has not reported any additional human cases. Health officials in Kampot are being taught how to identify symptoms of avian influenza and instructed to notify the provincial health department. In September 2005, more than 1,000 water birds were reportedly found dead in poultry farms in Batambang and several other provinces. None of the birds tested have been confirmed to have the H5N1 virus. The Cambodian government has cooperated fully with the WHO, but the government has limited capacity to contain outbreaks of the disease. Compared to Thailand, in Cambodia, poultry farms are smaller but more numerous, and many chickens roam freely, while transportation and communications links are far less developed; hence monitoring the nation's poultry stocks is more difficult. The U.S. government assessment team that visited Laos, Cambodia, and Vietnam in July 2005 reported that the U.S. government, FAO, and WHO have strong working relationships with relevant ministries in the Cambodian government, while over 200 international donors and NGOs operating in the country could play an effective role in mobilizing an effective response to an outbreak of avian flu. On October 12, 2005, U.S. Secretary of Health

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[56] WHO, *Avian Influenza and the Pandemic Threat in Africa: Risk Assessment for Africa*, Oct. 28, 2005.

[57] This section prepared by Thomas Lum, Specialist in Asian Affairs, 7-7616.

and Human Services Michael Leavitt, on a visit to Southeast Asia, signed a cooperation agreement with Cambodian officials pledging $1.8 million to Cambodia to help the country guard against the spread of H5N1.[58] United Nations experts estimated that Cambodia needs $18 million to develop programs to stem the spread of the virus. In December 2005, Germany announced that it would provide $3 million to the kingdom to help fight the disease.[59]

People's Republic of China, Including Hong Kong[60]

The November 2005 confirmation of the first human cases and deaths from H5N1 in China in 2005 renewed fears that the spread of H5N1 could accelerate within China.[61] The close proximity of millions of people, birds, and animals in southern China has made it a common breeding ground for deadly types of influenza viruses, including the H5N1 avian flu virus, that jump the species barrier to humans. Added to this, the PRC's poor public health infrastructure and the traditionally secretive, un-transparent policy approach of its communist government have made international health specialists particularly concerned about the PRC as a possible contributor to an H5N1 flu global pandemic. Health care specialists have cited the PRC government's early lack of cooperation during the outbreak of Severe Acute Respiratory Syndrome, or SARS — a previously unknown virus that surfaced in southern China in 2003 — as a principal cause for that virus' quick global spread before it was contained.[62] As of January 23, 2006, there had been 33 outbreaks of the H5N1 strain in Chinese poultry since late October 2005, heightening international health concerns.

Hong Kong in late 1997 is where the H5N1 avian flu virus for the first time was recorded as jumping directly from its traditional animal species to humans, infecting 18 people in Hong Kong and killing six. Although the Hong Kong government responded aggressively at that time, in three days exterminating its entire poultry population of 1.5 million birds, the 1997 outbreak marked the beginning of the cycle of H5N1 outbreaks that expanded on a much wider scale throughout Asia in late 2003 and early 2004. On January 27, 2004, a WHO official stated that a "staggering" number of birds, both migratory and domestic, were infected with the virus in at least ten Asian countries. That same day in 2004, the PRC became the tenth country to acknowledge ongoing outbreaks of avian flu within its borders. According to WHO, H5N1 is now considered endemic in parts of China. In addition to afflicting

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[58] "U.S., Cambodian Health Ministers Sign Deal on Bird Flu Cooperation," *Agence France Press*. October 11, 2005.

[59] "Cambodia Needs $18 Million for Bird Flu Fight — UN," *Reuters*, December 16, 2005.

[60] This section was prepared by Kerry Dumbaugh, Specialist in Asian Affairs, 7-7683.

[61] As of February 2, 2006, WHO has confirmed 10 human cases of avian flu in China, including 7 deaths. The cases have occurred in 7 provinces: Anhui, Guangxi, Liaoning, Jiangxi, Fujian, Hunan, and Sichuan.

[62] For more on SARS — Severe Acute Respiratory Syndrome — see CRS Report RL32227, SARS, Avian Flu, and other Challenges for China's Political, Social, and Economic Transformation.

domestic poultry and migratory birds in isolated parts of China, H5N1 also has been documented in parts of China's pig population.[63]

The 2003 SARS experience appears to have made PRC leaders more sensitive to potential catastrophic health issues. Consequently, Beijing has been far more assertive in enacting measures to combat the H5N1 virus. But even with the positive steps that have been taken, PRC officials face enormous problems in implementation. The PRC Ministry of Health reports it has established 63 influenza monitoring labs throughout most of China[64] and has crafted and published an emergency plan for an influenza pandemic, including a four-color-coded notification system.[65] On November 21, 2005, PRC agricultural officials at a press conference further announced the adoption and immediate implementation of contingency regulations to combat the spread of the disease and to punish government officials that delay or obfuscate medical and scientific reports about the virus. The regulations include requirements that provincial and municipal level officials notify the central government within four hours after a new flu outbreak.

By November 2005, PRC officials confirmed that they had either destroyed or vaccinated millions of healthy domestic poultry and that they were planning to inoculate the entire Chinese poultry population, a massive effort which would include as many as 14 billion chickens, geese, and ducks.[66] As a logistical effort, the initiative faces daunting difficulties — first among them the sheer size of China's poultry population and the fact that the poultry industry is widely scattered, including millions of rural households with a dozen or fewer chickens that roam free. Second, according to medical experts, the poultry vaccine to be fully effective must be given in two separate doses about a month apart, meaning the entire undertaking has to be performed twice for a single inoculation to be effective.[67] In addition, some health officials have expressed concern that such a broad campaign could backfire and actually contribute to spreading the disease further. Potential problems include the use of unlicensed or substandard vaccines (a problem announced in Liaoning Province in 2005) which could mask flu symptoms in birds but leave them still

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[63] According to the U.S. CDC. See website at [http://www.cdc.gov/flu/avian/outbreaks/asia.htm].

[64] *Beijing Liaowang* in Chinese. Translated on September 26, 2005, in FBIS, CPP20051018050001.

[65] PRC Ministry of Health, "Preparations and Plan for an Influenza Pandemic Emergency," September 28, 2005, translated in FBIS, CPP20051012335002 (October 12, 2005).

[66] Cody, Edward, "China to vaccinate billions of birds; campaign aims to stem avian flu," *Washington Post*, November 16, 2005, p. A15.

[67] Fountain, Henry, "How to vaccinate 14 billion birds," *The New York Times*, November 20, 2005, p. 2.

contagious;[68] and the possibility that vaccinators themselves could spread the virus on their clothing or shoes unless rigid decontamination procedures are followed.[69]

In another anti-flu initiative, on November 2, 2005, the Chinese government announced an earmark of 2 billion yuan ($420 million) from China's current budget to fight avian flu and the banning of poultry imports from 14 countries affected by avian flu. The Swiss manufacturer of Tamiflu, Roche, also announced it had reached an agreement with China on developing a generic version of Tamiflu.[70]

Despite these preparations, some international health experts quietly continue to question the PRC's transparency on avian flu issues. In late April and June 2005, for instance, PRC officials reported an unknown cause for the suspicious sudden deaths of thousands of migratory birds in western China's Qinghai Lake. In July 2005, a virology team from Hong Kong reported in a scientific journal that their research showed the Qinghai bird deaths were from an H5N1 strain genetically similar to that originating in south China. The Hong Kong report was vigorously criticized as inaccurate by Jia Youling, an official with the PRC Ministry of Agriculture charged with coordinating avian-flu eradication.[71] On June 18, 2005, the *Washington Post* reported that Chinese farmers had been using one of two types of anti-influenza drugs (amantadine, a drug meant for humans) to treat poultry for the H5N1 bird flu virus, potentially rendering the drug ineffective against the virus strain in humans — a story that PRC officials also have denied.[72]

In its anti-flu efforts, China also remains burdened by perennial problems involving local and regional compliance with central government directives. This takes on new dimensions when potential remedies — such as the mandatory destruction of infected poultry flocks — may rob indigent farming families of their principal source of food or cash.

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[68] Sipress, Alan, bird flu experts warn against bad vaccines; improper poultry inoculation may spread virus," *Washington Post*, November 22, 2005, p. A24.

[69] McNeil, Donald Jr., "Health experts fear Chinese flu vaccination plan could backfire," *The New York Times,* November 20, 2005, p. 12.

[70] Wright, Tom, "*Roche to Let Chinese Producer Make Flu Drug.*" New York Times, December 13, 2005.

[71] The independent virology team was from the University of Hong Kong and included Dr. Guan Yi, a co-author of the scientific report published in *Nature* magazine on July 7, 2005. For reference to PRC official Jia Youling's comments, see Sipress, Alan, "China has not shared crucial data on bird flu outbreaks, officials say," in the *Washington Post*, July 19, 2005, p. A15.

[72] *Washington Post*, June 18, 2005, p. A01. Some sources also have suggested that the virus' apparent new resistance to known drugs may be the result of renegade pharmaceutical labs in China dispensing the wrong anti-viral medications, raising additional questions about the PRC government's ability to exert control over a potential pandemic. *International Herald Tribune*, July 5, 2005, p. 3.

Indonesia[73]

Indonesia is viewed, along with Cambodia, Laos, and Vietnam, as a weak link in the effort to curb an outbreak of avian flu. A lack of resources, expertise, and a slow recognition of the problem has hindered Indonesia's response. Indonesia has a population of some 1.3 billion chickens with as many as 400 million of those in informal settings. Indonesia has resisted mass culling of bird populations. In 2003, when H5N1 was first seen in the bird population, there was not much alarm in Indonesia as the virus was not generally viewed as a significant threat to humans. The virus is now considered endemic in the bird population of Indonesia and outbreaks in birds have been reported in most of Indonesia's provinces. Concern grew in June 2005, when Indonesia saw its first human H5N1 fatality. WHO later confirmed H5N1 as the cause of death in July 2005. In October 2005, when a 38-year-old man and two of his children died of the disease in an affluent section of Jakarta, some began to speculate that the virus could spread from person to person, but to date this has not been verified. In the first quarter of 2006, deaths from H5N1 jumped in Indonesia, making it second only to Vietnam in number of fatalities from the virus.

While Indonesia was viewed as initially trying to cover up the outbreak, it has more recently moved to address the problem. Plans to stem the spread of the disease, should it mutate and spread more widely among human populations, involve rapid reaction and vaccine distribution. Such an approach is dependent on early detection and reporting by local health officials, and the availability of the resources necessary to treat an outbreak. In December 2005, Indonesia announced a three-year national strategic plan to contain the avian flu virus. The plan will use such measures as culling, vaccination, and community-based surveillance of bird populations. Critics of the plan have pointed out that it does not address birds kept in informal settings.[74] In addition, the government plans to establish a national commission for bird flu control that includes all ministries, private and non-governmental agencies, and the Red Cross.[75]

In March 2006, Indonesia, Singapore, and the United States announced a trilateral effort based in Java to contain the avian flu. The three-year plan will include site surveys and data collection and aims to test implementation schemes that will then be replicated in other areas if successful. International health organizations are also included in the pilot project.[76]

The Indonesian government appears to be making limited progress in acknowledging and dealing with a large scale outbreak. Foreign Ministry Spokesman

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[73] This section prepared by Bruce Vaughn, Analyst in Asian Affairs, 7-3144.

[74] "Toll UP but Indonesia Ready for Bird Flu," *ISI Emerging Markets*. January 2, 2006.

[75] "Indonesia Set to Form National Commission for Bird Flu Control," Thai News Service. January 10, 2006.

[76] `1"Singapore, Indonesia, US to Start Work on US$ 4.5m Bird Flu Pilot Project," *Channel NewsAsia*. March 3, 2006.

Yuri Thamrin has stated "we need international cooperation to fight the virus."[77] Agriculture Minister Anton Apriyanto has indicated that the government will slaughter poultry to stem serious outbreaks. The minister had reportedly earlier stated that the government did not have enough money to compensate farmers for their slaughtered animals. The government reportedly spent $13 million in 2005 to cull infected livestock.[78] According to WHO expert Gina Samaan, Indonesian hospitals are increasingly prepared and "the surveillance system has been enhanced, in the sense that there has been lots of training undertaken to ensure that surveillance of the health department in the provincial and district levels can respond and can initiate an investigation."[79] Eleven companies in Indonesia account for 60% of Indonesian poultry and are reportedly reluctant to allow government monitoring of their birds for fear that they will not be compensated for birds killed to stem an outbreak of the H5N1 avian influenza. Indonesia's poultry industry generated $3.75 billion in revenue in 2004.[80]

Health experts believe Indonesia does not have a sufficient supply of antiviral treatments for a country with more than 200 million people, and where H5N1 is endemic among the bird population. In September 2005, Indonesia's Minister of Health asked for international assistance and expressed concern that the country is not capable of containing the spread of H5N1.[81] Since then, the international community has pledged $140 million in assistance, and the Indonesian Government has allotted just over $60 million for bird flu prevention.[82] WHO officials have also called for countries to donate antiviral drugs to Indonesia. Additionally, Australian Foreign Minister Alexander Downer has warned that Indonesia is not prepared to respond to an avian flu outbreak amongst its human population. Australia has pledged funding to Indonesia for the purchase of Tamiflu tablets to treat about 40,000 people.[83] India has also reportedly agreed to provide 1,000 doses, adding to Indonesia's own supply of 10,000 doses.[84]

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[77] "Indonesia Calls for Intl Cooperation to Combat Bird Flu," *Dow Jones Newswire*. Sept. 30, 2005.

[78] Alan Sipress, "Indonesia Warns of Possible Bird Flu Epidemic," *Washington Post*. September 21, 2005.

[79] "Indonesia Making Progress in Fight Against Bird Flu - WHO," *AFX Asia*. September 30, 2005.

[80] Phelim Kyne and Fitri Wulandari, "Indonesian Poultry Cos Hobble Avian Flu Control Ops," *Dow Jones Newswires*. October 5, 2005.

[81] Reuters, "Indonesia says bird flu outbreak may become epidemic." September 21, 2005. [http://www.alertnet.org].

[82] "Indonesia Set to Form National Commission for Bird Flu Control," Thai News Service. January 10, 2006.

[83] Nicholas Zaminska, "Asian Nations Start Critical Bird Flu Preparations," *The Wall Street Journal*. October 3, 2005.

[84] Eaton, Dan and Telly Nathalia, "Indonesia says bird flu outbreak may become epidemic." Reuters. September 21, 2005. [http://www.alertnet.org/thenews/newsdesk/JAK58836.htm].

Reporting indicates that Indonesian officials were aware of bird flu in the bird populations for two years but suppressed the information until humans began to become infected. It has been asserted that "the Indonesian government failed to take measures that could have broken the chain, [of the spread of bird flu] while discouraging research into the outbreak." The outbreak was evidently suppressed due to lobbying by the poultry industry in Indonesia. There are also allegations that the Indonesian government has not funded its announced policy to vaccinate poultry against the virus.[85]

Laos[86]

An outbreak of H5N1 avian flu in poultry was confirmed early 2004, but Laos has had no known cases in humans, according to the WHO. There have been no reports of avian influenza in birds or humans in Laos in 2005.[87] As of June 2005, the Lao government estimated that 60,000 birds had been lost to the infection and another 98,000 to culling. However, this number reflects only documentation from commercial farms; the vast majority of poultry-rearing in Laos takes place in smaller, family-run farms.

Some experts argue that there is an urgent need for foreign health organizations to focus upon and assist Laos, given its proximity to other countries with the disease and the lack of government capacity, particularly its weakness in surveillance. The central and local governments have limited capabilities for collecting and disseminating information, monitoring avian populations, and conducting laboratory analysis to confirm cases of the virus. In addition, according to a U.S. government assessment team that visited Laos, Cambodia, and Vietnam, the country's health care system faces "severe limitations" and would be "quickly overwhelmed" in the event of a large-scale human outbreak.[88] The FAO and the WHO reportedly have strong working relationships with the Lao government.[89] On October 13, 2005, U.S. Secretary of Health and Human Services Michael Leavitt, on a visit to Southeast Asia, signed a cooperation agreement with Lao officials pledging $3.4 million to Laos for controlling outbreaks of avian flu.[90]

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[85] Alan Sipress, "Indonesia Neglected Bird Flu Until Too Late," *The Washington Post*, October 20, 2005.

[86] This section prepared by Thomas Lum, Specialist in Asian Affairs, 7-7616.

[87] "WHO Urges Laos to Prepare for Deadly Human Version of Bird Flu," *Agence France Presse*, August 27, 2005.

[88] "U.S. Government Emergency Response to Avian Influenza: A Plan for Vietnam, Laos and Cambodia: Report from Country Planning Visits," July 2005.

[89] "WHO Urges Laos to Prepare for Deadly Human Version of Bird Flu," *Agence France Presse*. August 27, 2005

[90] "Intl Donors Pledge More Than $17M to Help Southeast Asia Combat Bird Flu," *Forbes.com*. October 13, 2005.

Russia[91]

The H5N1 strain spread into Central Asia in 2005 and was first diagnosed in southern Russia (in the Novosibirsk region) as well as in northern Kazakhstan in July 2005. Outbreaks in both countries were attributed to contact between domestic birds and waterfowl migrating from Southeast Asia. There have been no confirmed human cases in Russia. The avian flu spread to eight southern regions of Russia, including two regions bordering the Caspian Sea,[92] but did not spread north toward Moscow.. Besides Russia, avian flu was reported in 2005 in other countries bordering the Black Sea, including Romania, Turkey, and Ukraine, and human cases were reported in Turkey in early 2006. The WHO is concerned about the widening geographical spread of the avian flu into Russia and neighboring countries, because it increases opportunities for humans to catch the virus and for the virus to improve its transmissibility through mutation or reassortment.[93] The WHO's National Flu Center in St. Petersburg announced in August 2005 that it would work more closely with the Vektor Virology Center in southern Russia, which had been monitoring flu viruses among wild migratory birds for several years.

In response to the reports of outbreaks in Russia, the EU in late August raised "serious concerns" that the virus could spread to Western Europe and called on member-states to step up surveillance efforts. It also banned the import of poultry from Russia. Responding to rumors that the avian influenza had spread into western Russia, Germany in October temporarily ordered free-range poultry to be kept indoors, as did the Netherlands in August. Iran, in September 2005, banned the import of Russian wheat as feedstock.[94]

Most observers judged Russia as fairly efficient in identifying avian influenza cases and working with international health organizations, at least at the outset. The areas where the outbreaks occurred were quarantined. No poultry or products were permitted to be exported beyond the areas, poultry in these areas exposed to H5N1 were slaughtered, and many people were examined and immunized. Russia's Deputy Foreign Minister Alexander Yakovenko asserted in early October 2005 that Russia had made a major contribution to countering the spread of avian flu and pandemic flu worldwide.[95] Other observers raised concerns about Russia's ultimate capacity to respond to the spreading virus, or to deal with human cases. They warned that since Russia has devoted few budgetary resources in recent years to improving healthcare, it has not adopted many newer disease-control measures, such as employing fewer and more highly trained staff, using advanced disease-detection

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[91] This section prepared by Jim Nichol, Specialist in Russian and Central Asian Affairs, 7-2289.

[92] The eight administrative areas are the Astrakhan, Chelyabinsk, Kurgan, Novosibirsk, Omsk, and Tyumen oblasts (regions), the Kalmyk republic, and the Altay kray (territory).

[93] World Health Organization. *Geographical Spread of H5N1 Avian Influenza in Birds: Situation Assessment and Implications for Human Health*, *Update 28*, August 18, 2005.

[94] *Agence France Presse*, August 22, 2005; *Foreign Broadcast Information Service* (FBIS), September 3, 2005, Doc. No. IAP-11012.

[95] *The Lancet*, August 27-September 2, 2005, p. 689; *Interfax*, October 4, 2005.

equipment, and relying more on primary healthcare. According to one commentator, "pandemic control requires prompt detection of cases and targeted interventions for the first clusters. But it remains doubtful whether Russia has the necessary capacity.... The country's huge size [also] is an obstacle to those services that do function well."[96]

Among measures taken by Russian federal and local officials, Chief Health Inspector Gennadiy Onishchenko issued a directive in August 2005 to implement the May 2005 recommendations of WHO on controlling a possible influenza pandemic. According to WHO criteria, Onishchenko stated, Russia is in the second stage of the avian flu epidemic, when the virus is spreading among fowl and can cause human illness, although it has not become easily transmissible among humans (see Table 1). He called for regional officials to "introduce the necessary corrections into regional plans to prepare for a [human] flu pandemic," including the "allocation of additional funds" for prevention and treatment, and to coordinate these plans with the federal government. In October 2005, he issued instructions to regional and health officials regarding the clinical pattern, differential diagnosis, and prevention and treatment of H5N1 influenza in humans. Regional officials complained that the regions had strained to shoulder the financial burden of compensating owners for the destruction of birds and of other containment measures. Consequently, regional representatives have called on the federal government to provide more funds for responding to possible new outbreaks among poultry, as well as humans. Some observers have also noted that the federal government could have played a greater role in coordinating regional outbreak responses. Analysts have noted that responses in each region were often divergent and not coordinated.[97]

Some Russian doctors and officials have argued that the risk of a pandemic is low, but that the best methods to hedge against such a possibility are better medical care to boost the health of at-risk Russians, flu immunizations for these Russians, and reserve supplies of flu vaccine.[98] They suggest that existing human flu vaccines may help protect the population if H5N1 becomes readily transmissible among humans. In early September 2005, Vladimir Fisinin, the Vice President of the Russian Academy of Agricultural Sciences, called for the Russian government to allocate funds to produce 40 million doses of existing human flu vaccines, as well as 20 million reserve doses. At the same time, the St. Petersburg Institute of Influenza is working with WHO on the development of a human vaccine targeting the H5N1 influenza virus. The Institute in late 2005 reported promising tests in animals, and plans human clinical trials in 2006. The Moscow newspaper *Nezavisimaya gazeta* in late October 2005 urged the Russian government to also consider buying Tamiflu to treat humans in case of a pandemic.[99]

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[96] *The Lancet*, August 27-September 2, 2005, p. 689.

[97] *FBIS*, August 18, 2005, Doc. No. CEP-19027.

[98] *FBIS*, September 13, 2005, Doc. No. CEP-346004.

[99] *ITAR-TASS*, October 23, 2005; *ITAR-TASS*, October 27, 2005; *FBIS*, October 24, 2005, Doc. No. CEP-346001; December 6, 2005, Doc. No. CEP-346002.

Russian President Vladimir Putin called in November 2005 for the legislature to approve Russian membership in the U.N.'s FAO, in order to facilitate cooperation with member countries in combating epidemics, including avian influenza. Russia's Federal Service for Veterinary and Plant Control (VPC) in September 2005 proposed that OIE, the European Commission's Health and Consumer Protection Directorate, and U.S. veterinary officials launch a joint program in early 2006 to monitor avian influenza in water fowl as they migrate from places where they spend the winter — Southeast Asia, Africa, northern Australia and Oceania — to Europe, Asia and North and South America. The VPC warned that the H5N1 virus is likely to reappear in southern Russia in Spring 2006 and possibly infect birds migrating towards Central and Eastern Europe.[100]

Thailand[101]

Thailand, among the earliest and hardest hit by the avian flu, has emerged as a leader in fighting the spread of the virus. From the initial 2003 outbreak, 8 of Thailand's 12 reported human cases were fatal.[102] Fourteen of the 22 reported human cases have been fatal to date. As a major poultry exporter, Thailand's economy has suffered significantly from the impact on the industry. After an initially sluggish response, including allegations by the press that government officials covered up evidence of an outbreak[103], the Thai authorities have led the effort to respond to the problem and particularly to facilitate regional cooperation. During a meeting with Prime Minister Thaksin in September 2005, President Bush praised Thailand as a leader in fighting the disease and pledged further U.S. cooperation.

Considerable economic damage from the news of the influenza has spurred Bangkok to address the problem. Thailand's poultry exports, the fourth-largest in the world, bring in over $1 billion annually; the loss this year contributed to a 4.4% year-on-year contraction of the agricultural sector in mid-2005.[104] Both domestic and international demand for chicken fell due to fears of infection. Thailand needs 90 days without outbreaks in order to receive certification from the World Organization for Animal Health (OIE) to resume exporting fresh poultry.[105]

Thai authorities have taken several steps to contain the spread of avian influenza. The Department of Livestock Development, Ministry of Agriculture and Cooperatives is the focal point for combating the virus, while Department of Disease

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[100] *FBIS*, September 7, 2005, Doc. No. CEP-27067.

[101] This section prepared by Emma Chanlett-Avery, Analyst in Asian Affairs, 7-7748.

[102] WHO, *Cumulative Number of Confirmed Human Cases of Avian Influenza A/H5N1 Reported to WHO*, December 7, 2005. [http://www.who.int/csr/disease/avian_influenza/country/en/].

[103] "Thai Authorities Should Take Strong Action Against Bird Flu," *Bangkok Post* editorial. October 4, 2005.

[104] "Bird Flu: Asian Contagion?" *Economist Intelligence Unit*. July 25, 2005.

[105] "Thailand Has First Avian Flu Outbreaks in 3 Months," CIDRAP News at [http://www.cidrap.umn.edu]. July 11, 2005.

Control, Ministry of Public Health is also a key player. The National Committee on Avian Influenza Control, under the supervision of a Deputy Prime Minister, was established in 2004 to map out national strategy. As part of the plan, over 40 million birds have been exterminated, and surveillance teams have been deployed throughout the country. In December 2005, the Ministry of Public Health announced that Oseltamivir, an antiviral treatment for influenza, would be produced and distributed to the public at subsidized prices.[106] Bird smuggling from Cambodia was targeted by border authorities.[107] By mid-2005, over 11,000 poultry farms reportedly met the government's biosecurity standards. Thai officials acknowledge, however, that small farms with open-air facilities, which increase the risk of contamination, remain less regulated. Unlike China, Thailand bans the use of H5N1 vaccines in its poultry population. Law enforcement authorities cracked down on illegally imported bird flu vaccines from China; the H5N1 vaccine is prohibited because the government believes that its use in poultry could lead to further mutation of the virus.[108]

After the re-surfacing of the flu in July 2005, the Agriculture and Cooperatives Ministry established guidelines for poultry farmers to get permission from local leaders before moving their flocks. The movement of fowl is considered to be a key concern of livestock officials. Mobile checkpoints were set up in the provinces most affected to enhance scrutiny of such movements.[109] Fighting cocks have been implicated as one of the main transmitters to humans. The sport is intensely popular in Thailand, with up to 30 million spectators annually.[110] The industry, resistant to any form of government control, eventually struck a compromise with the Thai government which allows for the registration of the birds and the stadiums, as well as measures to control their movement. [111]

Thailand has promoted regional cooperation on containing the flu by leading an effort to establish a regional stockpile of vaccines, and proposing an ASEAN animal hygienic fund, along with a pledge of $300,000 to start the project. The proposed center would enhance cross-border surveillance and control measures, as well as serve as an information distribution center for all ASEAN countries on the spread of the virus.[112] Public Health Minister Suchai Charoenratanakul pledged that Thailand would contribute a minimum of 5% of its own supply to a proposed regional stockpile of antiviral drugs.[113] Thailand and Indonesia pledged to exchange information on influenza prevention and vaccine development. Thailand received

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[106] "Thai Public Health Minister Announced that Thailand Can Produce Oseltamivir," *Thai News Service*. December 8, 2005.

[107] "Squawking at the Bird Flu Warning," *Los Angeles Times*. September 1, 2005.

[108] "Thailand Cracks Bird Flu Vaccine Smuggling Syndicate," *BBC Monitoring Asia Pacific*. September 20, 2005.

[109] "Avian Flu - Fresh Outbreak," *Bangkok Post*. July 14, 2005.

[110] "Squawking at the Bird Flu Warning," *Los Angeles Times*. September 1, 2005.

[111] "Ministry cuts Deal of Fighting Cock Zoning," *Bangkok Post*. July 15, 2005.

[112] "Thailand Proposes Regional Bird Flu Control Center," *Thai News Service*. September 27, 2005.

[113] "Bird Flu Pandemic Risk 'Very High'," *CNN.com*. October 11, 2005.

one million baht ($25,000) from FAO to set up laboratories and serve as a coordinating center for avian experts, and has received technical assistance from the European Union to improve networking between laboratories working on the avian influenza. Thailand also hosts platforms that are cited as key to the U.S. government response, including two Bangkok-based organizations that are crucial implementing partners for USAID.[114]

Turkey[115]

In early January 2006, the WHO confirmed four cases of H5N1 virus in humans; two of them, young siblings, were fatal. The deaths were the first from the virus outside of China and Southeast Asia, and researchers assume the virus was carried by migratory birds from Asia. As of March 16, 2006, the WHO confirmed 12 official cases and an additional two fatalities from H5N1. Most of the cases were in the eastern rural district of Dogubayazit.

Critics say that the Turkish authorities were slow to detect the virus. Since confirmation of the outbreak, several measures have been taken by the government in Ankara. Turkey's Ministry of Agriculture and Rural Affairs has overseen efforts to contain the spread of H5N1 in the regions afflicted with the virus by quarantining local areas and prohibiting people and animals from moving in or out the identified districts; instituting culling drives; and stepping up surveillance efforts. According to the Bird Flu National Coordination center, nearly 1.5 million birds have been culled, and the virus has been detected in 24 different cities. The central government has also initiated public awareness campaigns, restricted the transportation of poultry, prohibited hunting of winged animals, and established a national illness control center and local illness control centers.

WHO has been actively engaged with the Turkish authorities to contain the spread of the virus and provide additional support for laboratory diagnostic work. Imports of birds from Greece, Iran, and Romania have been banned. According to press reports, the Turkish Health Ministry has 15,000 courses of Tamiflu and has ordered an additional 100,000. No vaccine development is underway in Turkey.

There is widespread concern that the virus will spread from Turkey into several other countries. FAO, citing weak surveillance mechanisms along the border, urged Armenia, Azerbaijan, Georgia, Iraq, Iran and Syria to be on high alert for signs of infection. Seemingly confirming FAO's fears, a suspected H5N1 case was reported in Iraq on January 20, 2006.

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[114] "U.S. Government Emergency Response to Avian Influenza: A Plan of Action for Vietnam, Laos, and Cambodia - Report from Country Planning Visits July 11-24, 2005. " United States Agency for International Development.

[115] This section prepared by Emma Chanlett-Avery, Analyst in Asian Affairs, 7-7748.

Vietnam[116]

WHO reports that there have been 93 confirmed cases — including 42 deaths — of avian influenza in Vietnam since late December 2003. According to USAID, the H5N1 virus is believed to be endemic in Vietnam's waterfowl population. The Vietnamese government estimates the country's total poultry population to be around 250 million birds, including 20 million to 60 million ducks and geese. Between 60% and 70% of the poultry population is raised in "backyard farms," in close proximity to other birds, and the government estimates that 65% of farm households nationwide raise poultry. Poultry generally is sold live in local markets and is slaughtered at home. U.N. agencies have estimated that disease containment, including culling of poultry, have cost the Vietnamese economy an estimated $200 million.[117] The wartime and tsunami supplemental (P.L. 109-13), which the House passed on May 5, 2005 and the Senate on May 10, 2005, provides $25 million to help combat the disease, including approximately $7 million to be used in Vietnam.

In 2005, the Vietnamese government began intensifying its response to the disease by establishing an interagency working group that includes the FAO and WHO. At the local level, inter-ministerial steering committees have been established within the Vietnamese Communist Party's people's committees, which operate throughout the country. However, the quality of inter-ministerial coordination, in addition to the capacity of Vietnam's local institutions to monitor, report, and handle disease outbreaks, have been called into question. The central government in Hanoi is developing a national pandemic preparedness plan, and as of mid-October 2005 had presented a draft to international health agencies and foreign aid donors. Since the first outbreak of avian influenza was reported, over 40 million birds have been culled, though low compensation for farmers appears to have acted as a disincentive for farmers to report signs of infection. In August 2005, Vietnam began a mass poultry vaccination program. In early January 2006, the Ministry of Agriculture and Rural Development (MARD) declared that under the program, all provinces and cities had completed two phases of vaccinations for over 240 million birds. Critics have called Vietnam's previous poultry vaccination programs ineffective. In October 2005, the government signed a bilateral health cooperation agreement with the United States and agreed with a number of U.N. agencies to conduct a joint prevention program.

There are conflicting reports on the willingness of the Vietnamese government to cooperate with international health workers. Many accounts praise the government for responding quickly and cooperatively, particularly in the winter and spring of 2005, when two sets of initial blood tests by Vietnamese and WHO officials indicated that dozens, and perhaps scores, of Vietnamese might have been infected with the virus. Subsequent testing revealed that the initial test results had been false

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[116] This section prepared by Mark Manyin, Specialist in Asian Affairs, 7-7653.

[117] USAID, "U.S. Government Emergency Response to Avian Influenza: A Plan of Action for Vietnam, Laos and Cambodia. Report from Country Planning Visits," July 11-24, 2005.

positives.[118] Other accounts, which appear to be in the minority, have charged that the Vietnamese government has been uncooperative with international health agencies, particularly in the first months of the outbreak in 2004.[119]

Issues for Congress

Some experts point out that in order to effectively contain the spread of H5N1 and prepare for pandemic influenza, the U.S. government would need to develop a plan that integrates domestic and international policy. Some of the policy responses may originate domestically, but resonate globally. For example, issues related to U.S. drug policy, such as vaccine technology and intellectual property rights could impact access to antiviral drugs and vaccines in countries where H5N1 is endemic — particularly since some of the most affected countries do not have the capacity to produce or purchase sufficient quantities of the drugs.[120] One article in the Journal of Public Health Policy pointed out that "almost 40% of the world's supply of interpandemic influenza vaccines is used in countries that do not produce their own vaccines."[121] Below are some issues that particularly impact the most affected countries in Asia, and other parts of the world.

Patent Protections

Intellectual property rights has become an increasingly contentious issue in global health, particularly since companies began threatening to ignore patents for HIV/AIDS treatments. In an effort to expand global access to flu drugs, the United Nations had been encouraging Roche — the patent holder of Tamiflu — to license other companies to produce generic versions of the drug. Roche announced on October 21, 2005 that U.S. pharmaceutical companies could manufacture a generic version of Tamiflu.[122] Legislation introduced in the first session of the 109th Congress aims to permit the United States to invoke a compulsory license and export generic versions of the drug to non-producing countries.[123] Some speculate that Roche has been increasing efforts to license its products in other countries, in part because an Indian pharmaceutical company, Cipla, has threatened to manufacture a

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[118] See, for instance, Nicholas Zamiska, "Pandemic Watch: Inside U.N. Agency, Flu Data Sparked A Tense Debate," *The Wall Street Journal*, October 18, 2005.

[119] See, for instance, Adrian Levy and Cathy Scott-Clark, "Flu on the Wing," *The Guardian*, October 15, 2005.

[120] For more information on these issues see CRS Report RL33145, *Pandemic Influenza: Domestic Preparedness Efforts*, by Sarah Lister.

[121] Fedson, David, "Preparing for Pandemic Vaccination: An International Policy Agenda for Vaccine Development." *Journal of Public Health Policy 2005*, Volume 26, Issue 1, April 2005. p.11.

[122] Alonso-Zaldivar, Ricardo, "Roche agrees to generic version of Tamiflu drug." *Baltimore Sun*, October 21, 2005. [http://www.baltimoresun.com].

[123] H.R. 4392, *To provide for the importation of pharmaceutical products under a compulsory license as provided for under the World Trade Organization.*

generic version of the drug — in spite of Roche's patent rights. Underscoring that Tamiflu is too expensive for many of the least developed countries, a Cipla representative said that the company would sell the generic version of Tamiflu "at a humanitarian price" in developing nations, and not in the United States or Europe.[124] Two Indian pharmaceutical companies are reportedly negotiating with Roche to produce generic versions of Tamiflu.[125] Roche also reached an agreement with a Chinese pharmaceutical company to make the drug.[126]

Health experts predict that patent protections will continue to be a contentious issue as poorer countries seek to protect themselves against virulent diseases. Some analysts contend that Congress faces an issue of whether to help countries where H5N1 is endemic gain greater access to generic versions of Tamiflu and other antivirals if licensed drugs are not accessible.[127] Supporters assert that the precedent for greater access to generics by poorer countries had already been established on December 6, 2005, when World Trade Organization (WTO) members approved changes to the intellectual property agreement making permanent a decision on patents and public health.[128] The General Council decision means that for the first time a core WTO agreement will be amended. The decision directly transforms the August 30, 2003 waiver to Section 31(f) of the Trade-Related Aspects of Intellectual Property Rights (TRIPS).[129] The waiver permits a country without manufacturing capacity to obtain cheaper generic versions of patented medicines from countries under compulsory licenses. The waiver enables the country to receive generic versions of drugs in situations of "national emergency or other circumstances of extreme urgency."[130] A separate statement describes members' "shared understanding" on how the decision is interpreted and implemented. Particularly, the statement points out that the decision will be used in good faith in order to deal with public health problems and not for industrial or commercial policy objectives.[131] Although the waiver was seen as a tool to enable largely poorer countries to import

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[124] McNeil Jr., Donald, "Indian Company to Make Generic Version of Flu Drug Tamiflu." New York Times. October 14, 2005. [http://www.nytimes.com].

[125] Jack, Andrew, "India drugs groups in Tamiflu talks." Financial Times. December 12, 2005. [http://news.ft.com/home/us/]

[126] Wright, Tom, "Roche to Let Chinese Producer Make Flu Drug." *New York Times*. December 13, 2005. [http://nytimes.com]

[127] For more information on influenza and patent issues, see CRS Report RL33159, *Influenza Antiviral Drugs and Patent Law Issues.*

[128] WTO, "Members OK amendment to make health flexibility permanent." December 6, 2005. [http://www.wto.org/english/news_e/pres05_e/pr426_e.htm]

[129] Article 31(f) of the TRIPS Agreement says that production under compulsory licensing must be predominantly for the domestic market. The concern was that this could limit the ability of countries that cannot make pharmaceutical products from importing cheaper generics from countries where pharmaceuticals are patented.

[130] For more information on this issue see CRS Report RS21609, *The WTO, Intellectual Property Rights, and the Access to Medicines of Controversy*, by Ian F. Fergusson.

[131] WTO, "Members OK amendment to make health flexibility permanent." December 6, 2005. [http://www.wto.org/english/news_e/pres05_e/pr426_e.htm]

generic versions of licensed drugs, one piece of legislation proposes that the U.S. Trade Representative inform WTO that the United States declares itself an "eligible importing member" to import pharmaceutical products, largely because Roche is unable to meet the "public health needs" of the United States.[132]

WTO members voted against delineating which drugs should be included in the waiver agreement. Consequently, there is not consensus on which drugs are considered critical in protecting public health. Advocates argue that in the event of a pandemic, the new WTO amendment should apply to antiviral drugs and H5N1 vaccines for use in animals. Opponents are concerned that some might abuse and undermine the agreement by reselling the drugs and vaccines for profit. In the event of a pandemic, Congress might be faced with the decision on whether to support or oppose the export of generic antivirals. Additionally, increased pressure might be placed on Congress to encourage USDA to share with other countries some of its H5N1 vaccine for use in animals.

Global Data Sharing

In spite of Tamiflu stockpiling efforts, it is unknown if the medicine will be broadly useful in treating human H5N1 victims in a pandemic scenario. Some health experts were reportedly alarmed when two patients in Vietnam who were infected with H5N1 and aggressively treated with Tamiflu later died. Some are beginning to question if the recommended dosage should be changed, as doctors reportedly adhered to the recommended regimen when treating the two patients.[133] Health experts point out that more information is needed on patients who have already been treated for H5N1 with Tamiflu. Data from the subjects would help in determining if the drug remains effective in fighting H5N1 and if changes to dosage regimens are required.

Those pressing for greater international data sharing point to new research that might counter previous findings on the limited effectiveness of amantadine. The New York Times reported in September 2005 that researchers found that amantadine was no longer effective against H5N1. WHO reportedly spent $1.3 million to stockpile the drug when it was used during the 1997 H5N1 outbreak. The Times article asserted that in 2005, laboratory research found that all human viral samples of H5N1 were resistant.[134] Before 2000, almost no influenza virus was resistant to the drug. Some experts speculated that viral resistence occurred in part, because China reportedly used amantadine, intended solely for humans, on animals. (See "Affected Countries' Response" section). However, the Wall Street Journal quoted Dr. Shu Yuelong, the Director of China's national influenza laboratory, as stating that preliminary evidence indicates that amantadine might be effective in treating avian

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[132] H.R. 4392, *To provide for the importation of pharmaceutical products under a compulsory license as provided for under the World Trade Organization.*

[133] Chang, Alicia, "Bird Flu Victims Die After Drug Resistence." Washington Post. December 21, 2005. [http://www.washingtonpost.com]

[134] Rosenthal, Elisabeth, "Two Studies Find Flu Treatments Fall Far Short." September 22, 2005. [http://www.nytimes.com].

influenza in people.[135] Dr. Shu reported that all of the viral samples that have been isolated from patients in China were sensitive to amantadine. Those findings conflicted with previous research on virus samples that were taken from patients in Indonesia and found to be resistant to the drug. The new research has reportedly prompted WHO and other officials to consider whether amantadine might eventually play a role in fighting H5N1. The article underscores that there are currently too few samples to draw any firm conclusions.

Some believe that some countries are intentionally withholding viral samples of H5N1 cases. One article stated that countries with human H5N1 cases do not want to send viral samples to the WHO or other industrialized countries, because they fear the samples will be used to develop up-to-date vaccines which they will not have access to.[136] Others have speculated that China is withholding its samples, because it is trying to produce an H5N1 vaccine.[137]

Some analysts propose that the United States and other countries should vote to provide WHO with enforcement mechanisms. Supporters argue that WHO should be able to force countries to share viral samples. Others contend that Congress should provide greater support and resources to WHO, particularly for strengthening global laboratory and testing capabilities. Skeptics point out that WHO has not provided transparent, detailed data on the adequacy of funds or how funds are spent.

Global Disease Surveillance

A number of analysts have argued that due to insufficient investment in disease surveillance and health care in many of the countries where H5N1 is endemic, a pandemic may progress before it is discovered. In this view, ill-equipped surveillance systems will be slow to determine the source of a pandemic, evaluate the rate of viral transmission, ascertain whether H5N1 has become efficiently transmissible among humans, or rate the effectiveness of anti-flu initiatives. Senate Majority Leader Bill Frist has proposed $1 billion for a real-time international threat detection system.[138]

USAID and other U.S. government officials suspect that the lack of documented human cases of H5N1 in Laos has more to do with inadequate surveillance and

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[135] Zamiska, Nicholas, "Scientists Says Bird-Flu Virus Appears to Be Stable in China; No Signs that Avian Strain Is Easily passed by People; Old Drug Shows Promise." December 12, 2005.

[136] Globe and Mail, "Chinese officials haven't shared samples of H5N1: experts." November 18, 2005. [http://www.theglobeandmail.com].

[137] China Daily, "China: Bird flu vaccine for human use developed." November 15, 2005. [http://www.chinadaily.com.cn/english/doc/2005-11/15/content_494593_3.htm].

[138] Honorable Bill Frist website, "First Addresses National Press Club on Avian Flu — Pandemic: The Economy Killer." December 8, 2005. The Senate passed S. 2170 on December 22, 2005.

reporting systems than an absence of infection.[139] The New York Times reported that Laos has 69 veterinarians in the entire country, and all but two of them were trained in other Communist countries before the collapse of the former Soviet Union. Additionally, Laos reportedly has no veterinary school.[140] Some health experts believe that H5N1transmission could already be underway in Laos, since surrounding countries have already had human and animal outbreaks. Key U.S. agencies and international organizations have determined that Laos is a country that needs critical prevention, monitoring, and surveillance support in order to prevent full-blown human-to-human transmission of H5N1 that could emerge and sweep across the region without warning.[141] U.N. officials argue that Laos exemplifies the sort of long-term assistance that other poorer countries will require, such as training in veterinary services and surveillance systems, provision of surveillance and testing equipment, and support for farmer compensation.[142]

Some experts have expressed increasing concern about the capacity of poorer countries that have not yet had H5N1 cases to effectively contain the spread of the virus and plan for pandemic influenza, particularly in sub-Saharan Africa. FAO is particularly wary of the virus spreading across Africa, as the surveillance capacities and veterinary services in those countries are limited. According to Reuters, a WHO representative declared that an H5N1 outbreak would likely be initially missed in Africa, as bird nutrition is poor and high mortality among poultry is common. Concurrently, human cluster cases are likely to be missed due to poor surveillance systems. South Africa is reportedly the only country in sub-Saharan Africa to have drawn up a pandemic preparedness plan.[143] Some experts fear that an unabated H5N1 outbreak in Africa could make the bird flu endemic there. "If the virus were to become endemic in Africa, it could increase the risk that the virus would evolve through mutation or reassortment into a strain that could be transmitted to and between humans."[144]

The press reported on December 20, 2005 that a bird suspected of having contracted H5N1 in Ethiopia, tested negative of the virus.[145] Experts are concerned that birds in Ethiopia and other countries in the Rift Valley, including Kenya, Tanzania, and Uganda, are at particular risk of avian flu infection due to the large

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[139] Interview with USAID official, October 11, 2005.

[140] Bradsher, Keith, "*Health Officials Call for Long-Term Spending on Bird Flu.*" January 17, 2006. [http://www.nytimes.com]

[141] Ibid.

[142] Bradsher, Keith, "*Health Officials Call for Long-Term Spending on Bird Flu.*" January 17, 2006. [http://www.nytimes.com]

[143] Reuters, "Bird Flu in Africa Could Swamp Health Systems: WHO." November 27, 2005. [http://www.nlm.nih.gov/medlineplus/news/fullstory_27731.html]

[144] "UN agency says risk of bird flu spreading to Middle East, Africa rises markedly." U.N. News Center, October 19, 2005.
[http://www0.un.org/apps/news/story.asp?NewsID=16037&Cr=bird&Cr1=flu]

[145] Reuters Foundation, "ETHIOPIA: Birds Test Negative for avian flu." December 20, 2005. [http://www.alertnet.org]

numbers of migratory birds that fly to the region during the European winter. Those concerned about insufficient surveillance and diagnostic equipment and expertise, point out that Ethiopia had to use health experts and equipment from Egypt to determine what caused a rash of bird deaths in December 2005. USAID with support from the U.S. Navy Medical Research Unit (NAMRU) in Cairo reportedly provided $15,000 in emergency funding to analyze the viral samples of dead pigeons found in Addis Ababa and the Eastern Somali region for H5N1 infection. Additionally, USAID has reportedly reprogrammed $600,000 from existing surveillance funds for bird flu initiatives in Ethiopia.[146] The funds are to help provide technical assistance to the Ministries of Agriculture and Health, develop laboratory and communications capacity, and procure Personal Protective Equipment for first responders.

Many of the countries in which H5N1 is endemic have complained that they can not afford to implement the strategies recommended by the international community. Furthermore they are hesitant to divert their limited budgets — already struggling to contend with AIDS, child and maternal health, tuberculosis, and other health challenges — to something that might not occur. Advocates of greater assistance to the region, point out that countries with more resources for pandemic planning than neighboring poorer countries have also acknowledged difficulties in responding to the H5N1 threat. A news report cited a South Korean health worker who stated that his country is ill-equipped to respond to a pandemic citing insufficient supplies of medication, hospital beds, and ventilators.[147]

On December 22, 2005, the Senate passed S. 2170, which would help developing countries bolster their disease surveillance programs, and establish fellowships for citizens of those countries to study epidemiology and public health in the United States. Additionally, some in Congress have advocated for greater U.S. spending on fighting the global spread of H5N1 avian flu. Press reports quoted Representatives Henry Hyde and Tom Lantos, Chairman and Ranking Member of the House International Relations Committee respectively, stating concern about the level of funding the Administration proposes to provide for global efforts in FY2006[148]. Advocates assert that the Administration requests for international H5N1 initiatives will not sufficiently address the significant needs of countries with H5N1-endemic stocks. Particularly, experts add that the threat of an H5N1 or other influenza pandemic illuminates the neglect that health care systems in many southeast Asian countries have faced over the last couple of decades. Proponents argue that if the United States would increase its funding to support global health care systems the global community could benefit from efficient outbreak reporting and control measures, accurate diagnoses, enhanced case management, and improved disease surveillance and monitoring.

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[146] USAID, *H5N1 Avian Influenza (AI) Most Recent Developments and Actions.* November 26 - December 19, 2005.

[147] Grudgings, Stuart, "Rich-poor divide hobbles Asia's bird flu plans." Reuters, September 13, 2005. [http://www.reuters.com]

[148] GovEXEC.com, "House panel calls plan for tracking avian influenza 'inadequate'." December 7, 2005. [http://govexec.com/dailyfed/1205/120705cdpm2.htm]

Global Pandemic Planning

Some experts caution that pandemic preparedness plans must extend beyond procuring and stockpiling antiviral drugs and vaccines. In this view, governments must also develop detailed vaccine and treatment distribution plans. Particular attention has been paid to H5N1-affected countries that have communication and infrastructure barriers, especially between urban and rural areas (where many of the backyard poultry farms exist). Many Asian countries have significant income and infrastructure gaps between rural and urban areas. In the rural areas, there are often few hospitals and treatment centers. Equipment can be outdated or lacking. Veterinary and animal health services can be limited. Additionally, in many cases rural governments operate independently from urban governments, which tend to receive larger portions of national resources. Farmers in rural areas may not adhere to government H5N1 initiatives, exacerbating the problem. One infectious disease expert in Hong Kong asserted that the communication problem is particularly acute in China. "I trust and believe the central government has very good intentions, but unfortunately, it is a very big country. At the district, regional levels, the failure to communicate continues."[149]

Responses by East Asian Regional Groupings. At the 2005 Asia Pacific Economic Cooperation (APEC) Leaders' Meeting, held in Busan, South Korea, in November 2005, special attention was given to the threat of a pandemic influenza in the region. Efforts by the WHO, the FAO, the OIE, and the IPAPI were endorsed and reinforced at the Leaders' Meeting. The APEC Initiative on Preparing for and Mitigating an Influenza Pandemic calls for collective, transparent measures to exchange expertise and information to prevent a possible pandemic. Regional cooperation has been spurred by fear of massive economic and human costs: an Asian Development Bank (ADB) report concluded that a pandemic in Asia could kill three million people and cost the region close to $300 billion, nearly 6.5% of gross domestic product.

As Southeast Asia's major multinational forum, the Association of Southeast Asian Nations (ASEAN) has taken some steps to improve transnational coordination in combating the spread of a potential pandemic, and limiting the spread of the H5N1 virus. To this end, ASEAN members have created a number of institutional arrangements, including a Highly Pathogenic Avian Influenza (HPAI) Taskforce, an ASEAN Expert Group on Communicable Diseases, the ASEAN Animal Health Trust Fund, and the ASEAN Plus Three[150] Emerging Infectious Diseases Programme. At the eleventh ASEAN summit in Kuala Lumpur, Malaysia in December 2005, ASEAN leaders agreed to establish a regional vaccine stockpile that would channel the stocks to the most affected countries in order to control the spread as quickly as possible. Implementation details are not yet clear. Malaysia announced that it would set up a WHO headquarters to help coordinate regional plans to contain the disease, and Japan pledged $135 million to ASEAN to help fight H5N1.

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[149] Grudgings, Stuart, "Rich-poor divide hobbles Asia's bird flu plans." Reuters. September 13, 2005. [http://www.reuters.com]

[150] ASEAN Plus Three consists of the ASEAN countries plus China, Japan, and South Korea.

Drafting an avian influenza declaration was the single tangible achievement of the inaugural meeting of East Asia's newest regional grouping, the East Asia Summit (EAS), which met in Kuala Lumpur in December 2005 immediately following the ASEAN summit.[151] In their Summit Declaration on Avian Influenza Prevention, Control and Response, EAS leaders committed to "ensure rapid, transparent and accurate ...communications," establish information sharing protocols among member countries and multilateral organizations, create a regional network of stockpiles of antiviral, and to establish regional avian influenza and pandemic preparedness strategies backed by supporting national legislation.

Pandemic planners are warning that no country has the surge capacity to meet national demands for consumer products and medical services for the full term of an influenza pandemic (an estimated six months to a year). The United States, and other industrialized nations, rely on a range of critical products from H5N1-affected countries, such as medical supplies, military parts, and sanitation equipment. These supply chains are replenished "just-in-time" to minimize costs. If an outbreak were to occur, hospitals, food and water systems, and the military could all be vulnerable to interrupted supply due to absenteeism, border closures, and other supply chain disruptions. Therefore, the private sector, as well as national and international trade organizations have been urged to participate in pandemic planning.

Some analysts argue that resources allocated to containing the spread of H5N1 have been insufficient in part, because many countries have funded the response primarily through the ministries of agriculture and health. Some experts point out that an influenza pandemic will likely impact the animal and health sectors, as well as trade, security, hospitality, and labor. Consequently, they say, governments should develop pandemic plans that utilize the resources of other ministries that are often better funded, such as ministries of trade, tourism, and commerce. Some analysts note that U.S. officials, such as the U.S. Trade Representative and the Secretary of Commerce should be engaged in U.S. international pandemic influenza planning efforts. Others would like Congress to encourage public-private partnerships that augment U.S. international avian flu and pandemic preparedness efforts.

Combating Bird Flu Among Animals in Affected Countries

Most countries have used mass culling to prevent viral spread when avian influenza outbreaks are detected. However, some countries have not been able to rely on this process as a primary containment measure, because the governments might not have been able to compensate farmers for slaughtering their stocks. Scientists have also found that mass culling is sometimes not feasible when wild birds are involved in transmission. Some health experts assert that there should be more research on more affordable methods of preventing pandemics at their source — in the animals that carry the virus. Strategies such as implementing cleaning days

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[151] Participants in the first EAS included the ten ASEAN members (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam), the "plus three" states (China, South Korea, and Japan), as well as Australia, New Zealand, and India. For more on the summit, see CRS Report RS22346, *East Asian Summit: Issues for Congress*, by Bruce Vaughn.

(when all live markets are simultaneously emptied and cleaned), and separating ducks and chickens in live poultry markets may decrease viral transmission among animals. Some countries (including China) propose using vaccination to control avian influenza in poultry. Skeptics warn that animal vaccination is a risky strategy, as it is often difficult to distinguish infected from vaccinated animals, complicating efforts to track the disease. Additionally, vaccination campaigns, if not carried out properly, could result in entrenchment of the disease rather than eradication, further threatening public health. [152]

Cost of Culling. It has been suggested that a global fund should be established to compensate farmers for culling their poultry in countries whose governments can not afford to compensate the farmers. The WHO has already expressed concern that some farmers in poorer countries may not cull their poultry, because their livelihoods depend on poultry farming. For example, Indonesia has carried out only a limited culling drive, because it lacks the funds to compensate farmers.[153] Farmers in some parts of Romania reportedly failed to cull their birds despite government orders to do so. In some affected countries, public and animal health authorities are reluctant to destroy their population's dominant protein source and income. A number of bills, such as H.R. 4062 and its counterpart S. 1821, have been introduced that support the concept of a "Pandemic Fund", which could include funds for farmer compensation.

The World Bank announced that it would provide $500 million in loans to poor countries struggling to fund national avian flu and pandemic preparedness plans — a portion of which could be used to support poor farmers.[154] However, the Bank noted that $1 billion could be needed over the next three years to help countries contain the spread of H5N1. The Asia Development Bank (ADB) also announced that it is prepared to provide at least $470 million to support Asian anti-H5N1 and pandemic preparedness efforts.[155]

Some have suggested that the United States target some foreign aid funds to help the affected governments — including Vietnam, Indonesia, Cambodia, and Laos — cover the cost of compensating individuals and companies for the destruction of their birds. In this view, such assistance could help the image of the United States in the region by demonstrating American concern and could minimize reluctance to slaughter infected flocks. Others would like to see increased assistance to prevent the spread of H5N1 among animals.

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[152] Ilaria Capua and Stafano Manganon, "Vaccination for Avian Influenza in Asia," *Vaccine*, Vol. 22, 2004, pp. 4137-4138.

[153] Perry, Michael, "Poor Asian farmers are weak link in bird flu fight." Reuters. September 19, 2005. [http://www.alertnet.org/thenews/newsdesk/SYD28137.htm]

[154] World Bank, "New Global Program to Deal with Avian Flu." November 4, 2005. [http://www.worldbank.org]

[155] ADB, "ADB Support for Asia's Fight Against Avian Flu Could Reach $470 Million." November 9, 2005. [http://www.adb.org/Documents/News/2005/nr2005173.asp]

Global Economic Impacts

The International Monetary Fund recently released a report which outlined the potential global economic and financial impact of an avian flu pandemic. The report outlines some possible effects of a severe pandemic. According to the report, government finances might sharply deteriorate due to increased expenditure on health and public safety. Concurrently, IMF asserts that governments could experience a decrease in revenues as businesses and consumers avoid purchases, firms scale back production as employee attendance drops, and borders close. There could also be disruptions in payment systems leading to less revenue flow to national treasuries, the report predicts. Governments might also be indirectly affected if poultry businesses demand compensation, or if tourism, transport, retail, and insurance industries become bankrupt. Ultimately, the IMF document predicts that a severe avian flu pandemic could trigger a "sharp but short-lived impact" on the global economy. However, the report asserts that financially stable economies might be better equipped to contend with sharp fluctuations in GDP from quarter to quarter. The IMF document reported that countries previously affected by SARS, some countries that had recently dealt with avian flu outbreaks, and several countries with large, complex financial systems generally had more advanced preparations.[156]

Many economists assert that health and non-health related sectors could be severely affected by a global influenza pandemic, though it would be difficult to predict the costs of those effects. For example, Canadian and Asian hospitality and tourism sectors were considerably impacted during the SARS outbreak. In 2002 and 2003, SARS cost the Asia-Pacific region about $40 billion.[157] Additionally, flights to the region fell by about 45%, crippling the airline and hotel industries. Canada estimated that it lost approximately $1.2 billion, with about $763 million spent on the health-care system.[158] In the event of a flu pandemic, researchers expect Britain, Greece, Spain, Italy, and other countries that rely heavily on tourism, to be most affected economically. One economist estimated that a flu pandemic could force Britain's GDP to fall by 8% or $168 billion (about 95 billion pounds), and result in the loss of almost 1 million jobs (about 3% of all employment). [159]

The World Bank estimates that a global influenza pandemic could cost the global economy about $200 billion in one quarter or $800 billion over a year (about 2% of the global GDP). The Bank based its estimate on the economic losses induced by the SARS pandemic, which caused GDP to fall by 2% in Asia over a three month

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[156] IMF, *The Global Economic Impact of an Avian Flu Pandemic and the Role of the IMF*. February 28, 2006. [http://www.imf.org/external/pubs/ft/afp/2006/eng/022806.htm]

[157] Osterholm, Michael, "Preparing for the Next Pandemic." Foreign Affairs, July/August 2005. [http://www.foreignaffairs.org].

[158] Ibid. Country-specific SARS-related information, including costs and fatalities can be found in CRS Report RL32072, *Severe Acute Respiratory Syndrome (SARS): The International Response*, by Rhoda Margesson and Tiaji Salaam.

[159] Nordland, Rod and George Wehrfritz, "A Costly Disease: Europe and the rest of the world braces for the economic fallout of a possible bird-flu pandemic." October 24, 2005. [http://msnbc.msn.com/id/9711926/site/newsweek/]

period in 2003. However, the Bank underscored that it is virtually impossible to accurately determine how much a global influenza pandemic would cost the world, because experts assume that the immediate shock during a flu epidemic could be larger and last longer than SARS. The 1918 pandemic, for example, came in three waves, and spread over two years.[160] Some economists have advised the United States to identify source countries for key imports and develop a detailed plan that would ensure continuity.

Economists point out that an Asian economy crippled by an influenza pandemic could impact the U.S. economy, even if a significant number of Americans was not sickened or killed by H5N1. According to U.S. Trade Representative (USTR) Robert Portman, South Korea and Malaysia are the 7th and 10th largest trading partners for the United States, respectively. The United States earned $72 billion and $40 billion from South Korea and Malaysia, respectively, in 2004. Both countries have had H5N1 cases among their flocks.[161] Additionally, U.S. exports to China, one of the most threatened countries, grew 76 percent between 2000 and 2003, while sales to the rest of the world declined by 9 percent. China is now the sixth largest market for U.S. exports and America's third largest trading partner overall — surpassing Japan in 2003.[162] In 2004, U.S. exports to China grew to $33 billion, more than double the level in 2001.[163] Therefore, any pandemic related disruption of bilateral trade could have a large impact. Alternatively, some economists predict that U.S. poultry exports could increase as countries move to ban imported birds from countries with H5N1-endemic stocks.

CLSA Asia-Pacific Markets, the Asian investment banking arm of Crédit Agricole of France, estimates that H5N1 has already cost the region between $8 billion and $12 billion, citing the prolonged poultry ban by the European Union from eight Asian countries and the death or destruction of some 140 million chickens and other poultry. The Prime Minister of Thailand stated that the avian flu has already cost his country some $1.09 billion, in addition to the $55.78 million the government paid to farmers for a mass chicken cull.[164]

Some analysts caution that Congress should be prepared to respond to the impact that potential fluctuations in supply and demand from key Asian markets might have on the U.S. economy. Particularly, some would like Congress to direct the U.S. Trade

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[160] World Bank East Asia and Pacific Region, "Spread of Avian Flu Could Affect Next Year's Economic Outlook." November 2005. [http://siteresources.worldbank.org/INTEAPHALFYEARLYUPDATE/Resources/EAP-Brief-avian-flu.pdf]

[161] U.S. Trade Representative Robert Portman discussion at the US-ASEAN Business Council Second Annual Asia Forum, November 1, 2005.

[162] USTR website, "America's Trade with China." April 21, 2004. [http://www.ustr.gov]

[163] USTR website, "Real Results in U.S. Trade with China." September 9, 2004. [http://www.ustr.gov]

[164] Bullion, Alan, "Threats on the Wing." The World Today, August/September 2005. Also see, Bradsher, Keith, "Some Asian Bankers Worry About the Economic Toll From Bird Flu." New York Times. April 5, 2005. [http://www.nytimes.com]

Representative to prepare a report that comprehensively analyzes the potential economic gains and losses to the U.S. economy in a pandemic scenario due to changes in Asia's economy. Experts point out that the Congressional Budget Office (CBO) report *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues* focuses on possible supply and demand changes in the U.S. economy if an H5N1 pandemic were to reach the United States.[165] The Wall Street Journal reported that the U.S. poultry industry currently exports about 15% of its chicken meat annually, earning $2.2 billion in 2004. The article asserted that some poultry-industry executives are concerned that importing countries might reject poultry from states that have vaccinated the animals.[166] Consequently, many executives in the poultry industry are opposed to vaccinating chickens intended for export. Some would like Congress to require USDA to present clear guidelines on how and when poultry would have to be vaccinated.

Global Biosafety

In October 2005, scientists reported that the 1918 influenza pandemic that had killed between 20 million and 50 million people worldwide may have emerged from an avian flu strain. Health experts have debated whether the genetic sequence of the 1918 influenza should be published. Some were concerned that the information could be used to construct a biological weapon. However, other scientists argued that sharing such important findings is critical to efficiently identifying dangerous viruses, and to finding ways to disable them. Ultimately, the genetic sequence was published.[167] Dr. Anthony Fauci, Director of the National Institute of Allergy and Infectious Diseases, and Dr. Julie Gerberding, Director of the CDC, said in a joint statement, "The new studies could have an immediate impact by helping scientists focus on detecting changes in the evolving H5N1 virus that might make widespread transmission among humans more likely." Furthermore, the HHS National Science Advisory Board for Biosecurity "voted unanimously that the benefits [to making the results public] outweighed the risk that it would be used in a nefarious manner."[168] However, the Administration acknowledged that the influenza virus could be used as a biological weapon and added the virus to the Select Agent list on October 20, 2005.[169] Congress authorized the Select Agent program in the late 1990s to track the

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[165] CBO, *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues.* December 8, 2005. [http://www.cbo.gov/ftpdocs/69xx/doc6946/12-08-BirdFlu.pdf]

[166] Kilman, Scott, "Vaccine Remains Sticking Point in U.S. Defense Against Bird Flu." December 12, 2005. [http://www.wsj.com]. Basic screening tests for bird flu used by many importing countries leave ambiguous whether a bird testing positive is infected with H5N1 or has been vaccinated against it.

[167] Kolata, Gina, "Experts Unlock Clues to Spread of 1918 Flu Virus." New York Times, October 6, 2005. [http://www.nytimes.com]

[168] Ibid.

[169] CDC, "Possession, Use, and Transfer of Select Agents and Toxins — Reconstructed Replication Competent Forms of the 1918 Pandemic Influenza Virus Containing Any Portion of the Coding Regions of All Eight Gene Segments." 70 Federal Register 61407, October 20, 2005.

movement of certain bacteria and viruses that could potentially be used as bioterrorist weapons.[170]

Health specialists caution that lab safety must be a top priority as other countries begin to develop their own research and vaccine capacities. Some are closely watching Taiwan in its effort to build its own influenza vaccine factory.[171] Japan, already accomplished in viral research, is reportedly helping Vietnam build a biosafety lab to work with the influenza virus.[172] If global influenza vaccine production is to increase, disease experts caution that some form of oversight must first be established. Some scientists advocate the development of an international influenza research facility. Supporters envision a global laboratory that could rapidly identify influenza threats, and produce appropriate vaccines. It also could, they say, streamline existing flu monitoring systems. Opponents of this idea believe that current technology, such as the WHO's Internet-based FluNet, is fully capable of obtaining the same goal. Furthermore, critics believe that scientists might lose interest in sharing viral samples, if they believe their analytical and research capacities will be taken away.[173]

S. 1873, *The Biodefense and Pandemic Vaccine and Drug Development Act*, would address production of pandemic products. The bill would authorize funding for surge capacity of manufacturing vaccines. It would also authorize funding for research and development of flu vaccines, counter measures, and pandemic products.

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[170] For more information, see the CDC Select Agent Program page at [http://www.cdc.gov/od/sap] and CRS Report RL31719, *An Overview of the U.S. Public Health System in the Context of Emergency Preparedness*, by Sarah A. Lister.

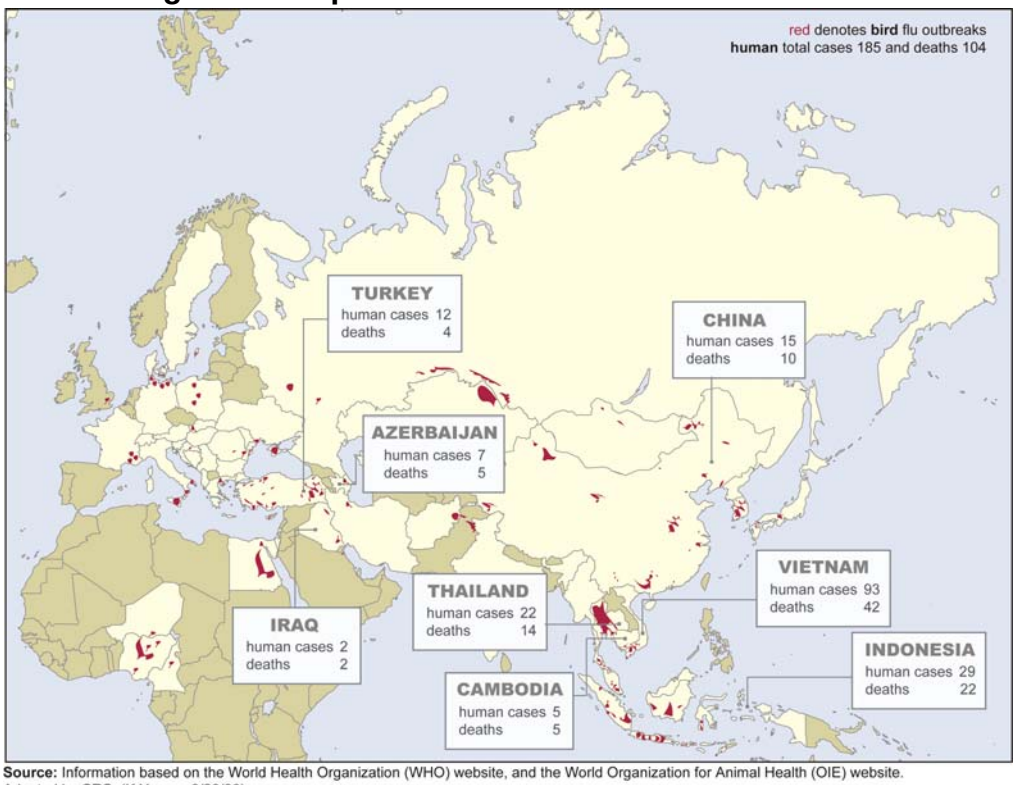
[171] Altman, Lawrence and Keith Bradsher, "Vaccine Alone Won't Stem Avian Flu, Experts Warn." New York Times. August 8, 2005. [http://www.nytimes.com]

[172] Interview with State Department staff, October 18, 2005.

[173] Abbott, Alison, "The flu HQ." Nature, Volume 414, November 1, 2001. [http://www.nature.com]

Appendix

Figure 1. Map of Human and Animal H5N1 Cases



Source: Information based on the World Health Organization (WHO) website, and the World Organization for Animal Health (OIE) website.
Adapted by CRS. (K.Yancey 3/28/06)

Table 2. WHO Pandemic Phases

Phase	Description	Overarching Public Health Goals
Interpandemic Period		
Phase 1	No new influenza virus strains have been detected in humans. A virus strain that has caused human infection may be present in animals. If so, the risk of human infection is considered to be low.	Strengthen global influenza pandemic preparedness at the global, regional and national levels.
Phase 2	No new influenza virus strains have been detected in humans. However, a circulating animal influenza virus strain poses a substantial risk of human disease.	Minimize the risk of transmission to humans; detect and report such transmission rapidly if it occurs.
Pandemic Alert Period		
Phase 3	Human infection(s) with a new strain, but no human-to-human spread, or at most rare instances of spread to a close contact.	Ensure rapid characterization of the new virus strain, and early detection, notification and response to additional cases.
Phase 4	Small cluster(s) with limited human-to-human transmission, but spread is highly localized, suggesting that the virus is not well adapted to humans.	Contain the new virus within limited foci or delay spread to gain time to implement preparedness measures, including vaccine development.
Phase 5	Larger cluster(s), but human to human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans, but may not yet be fully transmissible (substantial pandemic risk).	Maximize efforts to contain or delay spread, to possibly avert a pandemic, and to gain time to implement pandemic response measures.
Pandemic Period		
Phase 6	Pandemic: increased and sustained transmission in the general population	Minimize the impact of the pandemic.

Source: World Health Organization.

Table 3. FY2005 and FY2006 Enacted Emergency Supplemental and FY2007 Request for Global Avian Influenza Initiatives

($ millions)

AGENCY	FY2005 Emergency Appropriations Enacted	FY2006 Emergency Appropriations Enacted	FY2007 Request
Department of Health and Human Services	15.0[a]	114.0	145.0[b]
Department of Agriculture		18.0	5.0[b]
Department of Defense		10.0	10.0[b]
Department of State		6.0	0.0
USAID	16.3	132.0	55.0[b]
GRAND TOTAL	**31.3[c]**	**280.0**	**215.0**

Source: Prepared by CRS from FY2005 and FY2006 Emergency Supplemental appropriations, FY2007 budget requests per agency or department, and interviews with CDC Washington officials.

a. CDC Washington officials indicate that it spent $6 million on international avian flu activities through FY2005 appropriations. This figure is in addition to the $15 million provided through the FY2005 emergency supplemental.

b. U.S. Office of Management and Budget (OMB).

c. The FY2005 emergency supplemental permits the Secretary of State to transfer up to $656 million to various U.S. agencies for avian flu activities. USAID received $31.3 million of those funds, of which $15 million was transferred to HHS. See Congressional Response section and Department of State 2007 Budget Request at [http://www.state.gov/s/d/rm/rls/iab/2007/pdf/].

Table 4. International Partnership on Avian and Pandemic Influenza (IPAPI) Core Principles

1. International cooperation to protect the lives and health of our people;

2. Timely and sustained high-level global political leadership to combat avian and pandemic influenza;

3. Transparency in reporting of influenza cases in humans and in animals caused by strains that have pandemic potential, to increase understanding, preparedness and, especially to ensure rapid and timely response to potential outbreaks;

4. Immediate sharing of epidemiological data and samples with the World Health Organization (WHO) and the international community to detect and characterize the nature and evolution of any outbreaks as quickly as possible, by utilizing, where appropriate, existing networks and mechanisms;

5. Rapid reaction to address the first signs of accelerated transmission of H5N1 and other highly pathogenic influenza strains so that appropriate international and national resources can be brought to bear;

6. Prevent and contain an incipient epidemic through capacity building and in-country collaboration with international partners;

7. Work in a manner complementary to and supportive of expanded cooperation with and appropriate support of key multilateral organizations (WHO, Food and Agriculture Organization, World Organization for Animal Health);

8. Timely coordination of bilateral and multilateral resource allocations; dedication of domestic resources (human and financial); improvements in public awareness; and development of economic and trade contingency plans;

9. Increased coordination and harmonization of preparedness, prevention, response and containment activities among nations, complementing domestic and regional preparedness initiatives and encouraging where appropriate the development of strategic regional initiatives;

10. Actions based on the best available science.

Source: State Department Press Release, "U.S. Launches International Partnership on Avian and Pandemic Influenza." September 22, 2005. [http://www.state.gov/r/pa/prs/ps/2005/53865.htm]